

**WORK PLAN/
SAMPLING AND ANALYSIS PLAN**

**900 ALRECO
BENTON HARBOR, MICHIGAN 49022**

for

**THE CITY OF BENTON HARBOR BROWNFIELD
REDEVELOPMENT AUTHORITY
200 PAW PAW AVENUE
BENTON HARBOR, MICHIGAN 49022**

**AKT PEERLESS PROJECT NO. 6976F-2-20
AUGUST 8, 2011**

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FIGURE

1. Proposed Sample Location Map

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- A. Health and Safety Plan

**WORK PLAN/SAMPLING AND ANALYSIS PLAN
FOR
900 ALRECO
BENTON HARBOR, MICHIGAN**

1.0 INTRODUCTION

AKT Peerless Environmental & Energy Services (AKT Peerless) has prepared this Work Plan/Sampling and Analysis Plan (Work Plan/SAP) on behalf of The City of Benton Harbor Brownfield Redevelopment Authority (BHBRA) for assessment using BHBRA's U.S. Environmental Protection Agency (EPA) Hazardous Substance Grant. The purpose of this Work Plan/SAP is to document the (1) data gathering and sampling methodologies, (2) sample frequency, locations, and rationale and (3) procedures and protocol for the proposed subsurface investigation. The subject property was determined to be an eligible hazardous substance grant property by the EPA on April 7, 2011. Though there is the potential for some petroleum contamination at this site, based on results of AKT Peerless' June 2011 Phase I Environmental Site Assessment (ESA), volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PNAs), polychlorinated biphenyls (PCBs), and metals are the primary contaminants of concern.

2.0 PROPERTY LOCATION/DESCRIPTION

Parcel A of the subject property is located in the northwest and southwest $\frac{1}{4}$ of Section 8 in Benton Harbor (Township 4 South / Range 18 West), Berrien County, Michigan. Parcel B of the subject property is located in the northeast $\frac{1}{4}$ of Section 7 in Benton Harbor (Township 4 South / Range 18 West), Berrien County, Michigan. The subject property is situated on the northern and southern sides of Alreco and consists of a rectangular-shaped and an irregularly-shaped parcel that total approximately 14.39-acres of land. The Reid Group, LLC is the current owner of the subject property. The subject property's parcel identification numbers are 11-54-0007-0102-03-1 (Parcel A) and 11-54-0007-0102-02-3 (Parcel B).

2.1 FORMER AND CURRENT SITE USE

Parcel A consisted of agricultural land from at least 1930 until 1965 when an aluminum smelting facility consisting of two structures was constructed. Between 1965 and 1981 several additions and other structures were constructed including the auxiliary buildings and the bag houses. Currently, Parcel A contains a vacant aluminum smelting building. Identified previous occupants include Michigan Standard Alloys, Alreco Metal Inc., Harbor Diecast & Engineering, Tobian Metals, and Harbor Light Metals, LLC. Harbor Light Metals, LLC (HLM) operated on the facility until 2009 when operations ceased. Equipment, product and wastes associated with HLM former operations remain on the subject property.

Parcel B of the subject property consisted of agricultural land from at least 1930 until 1965 when a parking lot was constructed on the northeastern portion of Parcel B. In 1973 a bulk above-ground storage tank (AST) was constructed on the southern portion of Parcel B. Currently, Parcel B contains an asphalt-paved parking lot and an empty bulk AST.

Currently, the subject property is not being used for and obvious or significant purpose.

2.2 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

2.2.1 AKT Peerless June 2011 Phase I ESA (Benton Harbor BRA)

AKT Peerless was retained to conduct a Phase I Environmental Site Assessment (ESA) of the subject property. The Phase I ESA was conducted in accordance with (1) the United States Environmental Protection Agency (USEPA) Standards and Practices for All Appropriate Inquiries [(AAI), 40 CFR Part 312] and (2) guidelines established by the American Society for Testing and Materials (ASTM) in the *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process / Designation E 1527-05* (ASTM Standard Practice E 1527-05).

During the Phase I ESA, the following Recognized Environmental Conditions (RECs) were identified by AKT Peerless:

1. The subject property has contained an aluminum smelting company since at least 1965. Activities associated with this facility during this time included the use and storage of petroleum products and hazardous substances. It is AKT Peerless' opinion that a potential exists for the subject property's soil and groundwater to have been adversely affected by the historical use of the subject property.
2. AKT Peerless observed approximately 10,000 cubic yards of dross/salt cake. These piles were historically disposed of at a landfill and previous reports indicated that the dross and salt cakes have historically contained heavy metals and PCBs. In addition, AKT Peerless observed several bags of shredder and furnace dust throughout the facility. This dust was historically disposed of a hazardous material. It is AKT Peerless' opinion that a potential exists for the subject property's soil and groundwater to have been adversely affected by the bag house dust and dross/salt cakes currently located at the subject property.
3. Several pieces of equipment were observed in the production, maintenance building, and Parcel B. Staining and/or pooled liquid was observed around these pieces of equipment. Therefore, it is AKT Peerless' opinion that a potential exists for the subject property's soil and groundwater to have been adversely affected by these fixtures.
4. Several PCB-containing transformers were historically located on the subject property. In addition, a release of one of these transformers occurred in the ingot area this area was reportedly remediated. Further, AKT Peerless observed an old transformer in the maintenance building. It is AKT Peerless' opinion that a potential exists for the subject property's soil and groundwater to have been adversely affected by the historical use of PCB-containing transformers.
5. The subject property occupants historically utilized a septic system and water well. The water well was properly abandoned in 2005. However, it is AKT Peerless' opinion that a

potential exists for the subject property's soil and groundwater to have been adversely affected by the historical use of hazardous substances and/or petroleum products in connection to the septic system.

6. The subject property historically contained a waste oil UST, used oil UST, two diesel USTs, and two fuel oil USTs. According to previous reports these USTs have all been removed however, contamination above MDEQ GRCC still remains in the area of these former USTs. Therefore, in AKT Peerless opinion the former USTs and existing contamination represents and REC to the subject property.
7. Parcel A of the subject property contained a truck repair facility from at least 1965. In addition, According to previous reports an oil/water separator was closed in place on the subject property. Further, AKT Peerless observed staining throughout the former truck maintenance building. It is AKT Peerless' opinion that a potential exists for the subject property's soil and groundwater to have been adversely affected by the historical use of the subject property as a truck repair facility.
8. The subject property has existing VOC, PNA and metal soil and groundwater contamination above MDEQ GRCC and meets the definition of a "facility". Therefore, it is AKT Peerless opinion that the facility status of the subject property represents an REC.
9. The subject property historically contained an emergency generator which was fueled using a bulk fuel oil AST, underground piping, and a pump house. It is AKT Peerless opinion that the potential exists for the subject property's soil and groundwater to have been adversely affected by the former AST system.
10. Approximately one hundred 55-gallon drums of oil and other unknown substances were observed in the production building. These drums were stacked three high on wooden pallets and stains were observed nearby. It is AKT Peerless opinion that the potential exists for the subject property's soil and groundwater to have been adversely affected by the contents of these drums.
11. Railroad tracks extend from the northwestern and southwestern corners of Parcel A onto the subject property. In addition railroad tracks historical extended across the southeastern portion of Parcel B. Further, railroad tracks intersect Parcels A and B. Potential concerns typically associated with railroad tracks include the use of fill materials as ballast to support the ties and rails. It is AKT Peerless' opinion that a potential exists for the subject property's soil and groundwater to have been adversely affected by fill material used as ballast.
12. The western adjoining property contained a scrap yard from at least 1960 to 1999. Previous reports indicated that this facility historically contained 55-gallon drums. Therefore, it is AKT Peerless' opinion that a potential exists for the subject property's soil and groundwater to have been adversely affected by the western adjoining property.

Because RECs were identified during the performance of the Phase I ESA, further investigation and/or assessment is warranted in order to determine the current conditions at the subject property.

3.0 **PURPOSE AND SCOPE**

The purpose of this Work Plan/SAP is to evaluate the recognized environmental conditions identified in AKT Peerless' June 2011 Phase I ESA.

4.0 **SUBSURFACE INVESTIGATION FIELD ACTIVITIES**

The following field investigative activities will be conducted as part of the subsurface investigation:

- Drill up to 30 soil borings using a hydraulic probe rig to a maximum depth of 16 feet bgs.
- Sample ten (10) existing groundwater monitoring wells (if possible).
- Collect up to 30 soil samples from the soil boring locations.
- Collect one groundwater sample from each of the existing monitoring wells using low-flow sampling techniques.
- Submit the samples to laboratory for analysis of one of more of the following: volatile organic compounds (VOCs); polynuclear aromatics (PNAs), polychlorinated biphenyls (PCBs), and various Metals (aluminum, arsenic, barium, cadmium, chromium, copper, lead, magnesium, mercury, nickel, selenium, silver, and zinc). See table below for more specific details.
- Prepare a Phase II ESA Report.

If field observations indicate the possible presence of contamination (visual/olfactory evidence or significant photoionization detector (PID) responses), soil borings may be drilled deeper than 16 feet bgs to further assess subsurface conditions.

If existing groundwater monitoring wells are not located or show indications of damage, additional soil samples may be collected from adjoining soil borings and submitted for laboratory analysis.

The following table provides a summary of the proposed sampling plan.

PROPOSED SAMPLING PLAN

SOIL BORINGS AND SAMPLE COLLECTION*			
REC	SOIL BORING	SAMPLES	ANALYSES
1	AKT-1 through AKT-30	30 soil, 10 groundwater	VOCs, PNAs, Metals, and/or PCBs
2	AKT-7, AKT-11, AKT-16, AKT-21, AKT-29	5 soil, 4 groundwater	VOCs, PNAs, Metals, and/or PCBs
3	AKT-18 through AKT-21	4 soil	VOCs, PNAs, Metals, and/or PCBs
4	AKT-16 and AKT-17	2 soil	VOCs, PNAs, Metals, and/or PCBs

5	AKT-26 and AKT-29	2 soil, 1 groundwater	VOCs, PNAs, Metals, and/or PCBs
6	AKT-22, AKT-23, AKT-30	3 soil, 1 groundwater	VOCs, PNAs, Metals
7	AKT-24 through AKT-26	3 soil, 2 groundwater	VOCs, PNAs, Metals
8	AKT-1 through AKT-30	30 soil, 10 groundwater	VOCs, PNAs, MI Metals, and/or PCBs
9	AKT-4 through AKT-7	4 soil, 1 groundwater	VOCs, PNAs, Metals
10	AKT-11, AKT-16, AKT-21	3 soil, 2 groundwater	VOCs, PNAs, Metals, and/or PCBs
11	AKT-7, AKT-14, AKT-15	3 soil, 1 groundwater	VOCs, PNAs, Metals
12	AKT-1 through AKT-6	6 soil	VOCs, PNAs, Metals

*Please note that in several instances, soil and groundwater sampling will be conducted to address multiple RECs.

QUALITY ASSURANCE/QUALITY CONTROL SAMPLES				
MATRIX	DUPLICATE	EQUIPMENT BLANK	FIELD BLANK	MS/MSD
Soil	4	4	2	2
Groundwater	2	2	2	2

*Trip and Methanol Blanks will be collected one per cooler or batch, respectively.

5.0 INVESTIGATIVE PROCEDURES

This section presents the procedures and equipment for performing the planned subsurface investigation activities at the subject property. The number of samples associated chemical analyses, sample containers, preservation, and holding time requirements presented are provided in AKT Peerless' Quality Assurance Project Plan (QAPP). Standard forms including soil boring logs, daily field reports, and chains-of-custody are provided in the QAPP.

5.1 SOIL SAMPLE COLLETION

AKT Peerless will retain a drilling contractor to install the soil borings to a maximum depth of sixteen (16) feet bgs using a hand auger and/or hydraulic push probe or Geoprobe®. Borings will be advanced following American Society for Testing and Materials (ASTM) publication D-6282 *Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations*. When possible, a macro core soil sampler will be used to collect continuous soil samples. If subsurface soils restrict the penetration of the macro core sampler, a 2-foot-long discrete sampler will be used in place of the macro sampler. AKT Peerless will screen all soil samples with a PID. See the attached figure for a site map with the proposed sampling locations.

5.1.1 Soil Boring Location and Depth

The soil boring locations and depths were selected based on the results of AKT Peerless' Phase I ESA and are intended to evaluate the RECs identified in the Phase I ESA. Soil borings will be advanced to a maximum depth of approximately 16 feet bgs. The depth of the soil borings are based on the most likely release point of contamination for each REC. AKT Peerless expects that 16 feet bgs will be a sufficient depth to evaluate the RECs. If field observations indicate that contamination may be present at depths greater than 16 feet, then AKT Peerless will drill deeper soil borings. Soil samples from each soil boring will be collected continuously for field screening and visual characterization from each boring location.

5.1.2 Sample Collection Methodology

Soil samples will be obtained in accordance with AKT Peerless SOP-2.0, a copy of which is provided in the QAPP.

5.1.3 Selection of Soil Samples for Analyses

Soil samples will be collected to evaluate the recognized environmental conditions identified at the subject property. Based on AKT Peerless' field screening, soil samples will be collected from the most likely point of a contaminant release and/or migration for the identified RECs. Further, soil samples may be collected in areas where AKT Peerless observes visual/olfactory indication of contamination or a significant PID response. Soil samples will not be collected from saturated soil.

In addition to the operating procedures presented in AKT Peerless SOP-2.0 (Appendix D, QAPP), the following procedures will be followed when collecting soil samples for laboratory analyses:

- Soil sampling locations will be identified in the field and recorded in a logbook.
- Soil samples will be collected continuously.
- Soil samples will be selected for laboratory analyses and placed into laboratory-supplied containers.
- Sample containers will be labeled as described in the QAPP.
- Samples will be maintained at approximately 4 ° C during storage and shipment to the laboratory for analyses.
- Sampling equipment will be decontaminated in accordance with AKT Peerless SOP-5, presented in Attachment D of the QAPP.
- Lithologic characteristics (color, texture, grain size and consistency) of the soil at each soil boring location will be recorded on AKT Peerless Form No. FF-3.
- Soil boring locations will be scaled on a site map.

Soil sampling equipment may include the following:

- Health and safety equipment/health and safety plan (Exhibit 2 of QAPP),

- Geoprobe®,
- Hand Auger,
- Appropriate field forms, including chains-of-custody,
- Sample labels and custody seals,
- Logbooks, marking pens, overnight courier air bills and pouches,
- PID meter,
- Distilled or deionized water,
- Cooler with ice,
- Laboratory grade detergent, stiff brush, bucket, wash tub,
- Sample containers and packaging material,
- Tape measure, and
- Camera and film.

5.2 GROUNDWATER SAMPLE COLLECTION

If existing groundwater monitoring wells are not located or show indications of damage, additional soil samples may be collected from adjoining soil borings and submitted for laboratory analysis. See the attached figure for a site map with the proposed sampling locations.

5.2.1 Sample Collection Methodology

Groundwater samples will be collected from monitoring wells in accordance with AKT Peerless SOP-3.0. See the QAPP for a copy of SOP-3.0.

5.2.2 Selection of Groundwater Samples for Analyses

Groundwater samples will be collected from the upper 2.5 feet of the water table. The following procedures will be followed when collecting groundwater samples for laboratory analyses:

- Groundwater sampling locations will be identified in the field and recorded in a logbook.
- Dedicated/disposable sample tubing will be used to collect each groundwater sample to limit the potential for cross-contamination.
- Groundwater samples collected for laboratory analyses will be placed into the appropriate sample containers.
- Sample containers will be labeled as described in the QAPP.
- Samples will be maintained at approximately 4 ° C during storage and shipment to the laboratory for analyses.
- Groundwater sampling locations will be scaled on a site map.

Groundwater sampling equipment will include the following:

- Health and safety equipment/health and safety plan (Exhibit 2 of the QAPP),
- Peristaltic pump and disposable tubing,
- Conductivity, pH, and temperature meter(s),
- Appropriate field forms, including chains-of-custody,
- Sample labels and custody seals,
- Logbooks, marking pens, overnight courier air bills and pouches,
- Distilled or deionized water,
- Cooler with ice, and
- Sample containers and packaging material.

5.3 QA/QC SAMPLE COLLECTION

The following quality assurance samples will be collected during the investigation: (1) duplicate soil and groundwater samples, (2) MS/MSD soil and groundwater samples, (3) field blank, (4) equipment blank, (5) trip blank, and (6) and methanol blank. The rationale for quality assurance sampling is presented in AKT Peerless' QAPP. The required collection frequency of the QA/QC samples is identified in AKT Peerless' QAPP. See Section 4.0 of this Work Plan/SAP for more information on the proposed QA/QC sampling.

5.4 CHAIN-OF-CUSTODY

Chain-of-custody protocol is necessary to ensure the integrity of samples from the time of collection to data reporting. Chain-of-custody protocols include proper sample labels, sample seals, sample storage, sample shipment, and documentation. Refer to the QAPP for the detailed explanation of sample custody procedures.

5.5 DECONTAMINATION PROCEDURES

5.5.1 Sample Collection Equipment

Strict decontamination procedures will be followed during the completion of investigation personnel to reduce the potential for cross-contamination. All drilling and down-hole sampling equipment will be decontaminated prior to first use onsite, and thereafter between uses, using a high-temperature, high-pressure spray washer, and/or a vigorous wash in an Alconox solution, followed by a tap water rinse, and a distilled water rinse.

5.5.2 Disposal of Investigation Derived Materials

During the course of the field investigation activities, disposable personal protective equipment (PPE) will be generated. AKT Peerless will dispose this PPE as municipal waste.

5.6 PERSONNEL MONITORING

During subsurface investigation activities, air monitoring will be conducted to ensure that the proper level of PPE is used. During these activities, a PID will be used for periodic evaluation of organic vapor in the breathing zone. The AKT Peerless' site health and safety officer (SHSO) will record the time and levels in the appropriate field logbook. Recordings will be taken every four hours or more often if field personnel determine it is necessary. The personnel air monitoring conducted at the subject property will be evaluated for use in determining adequate levels of protection for the investigative workers. Additional personnel air monitoring will be implemented if conditions at the subject property warrant. The PID will be operated in accordance with AKT Peerless SOP-1.0.

6.0 HEALTH AND SAFETY PLAN


The site specific HASP provides guidelines and procedures to protect the health and safety of personnel conducting field activities. The plan has been developed based on requirements contained in the following regulations and guidance documents:

- 29 CFR 1910.120: *Safety and Health Regulation for General Industry*, Occupational Safety and Health Administration (OSHA), as amended, December 1986.
- Standard Operating Safety Guides, U.S. Environmental Protection Agency (EPA), 1992.
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, National Institute of Occupational Safety and Health Administration (NIOSH), Publication No. 85-115, October 1985.
- Refer to Attachment A for a copy of the HASP.

7.0 SIGNATURE

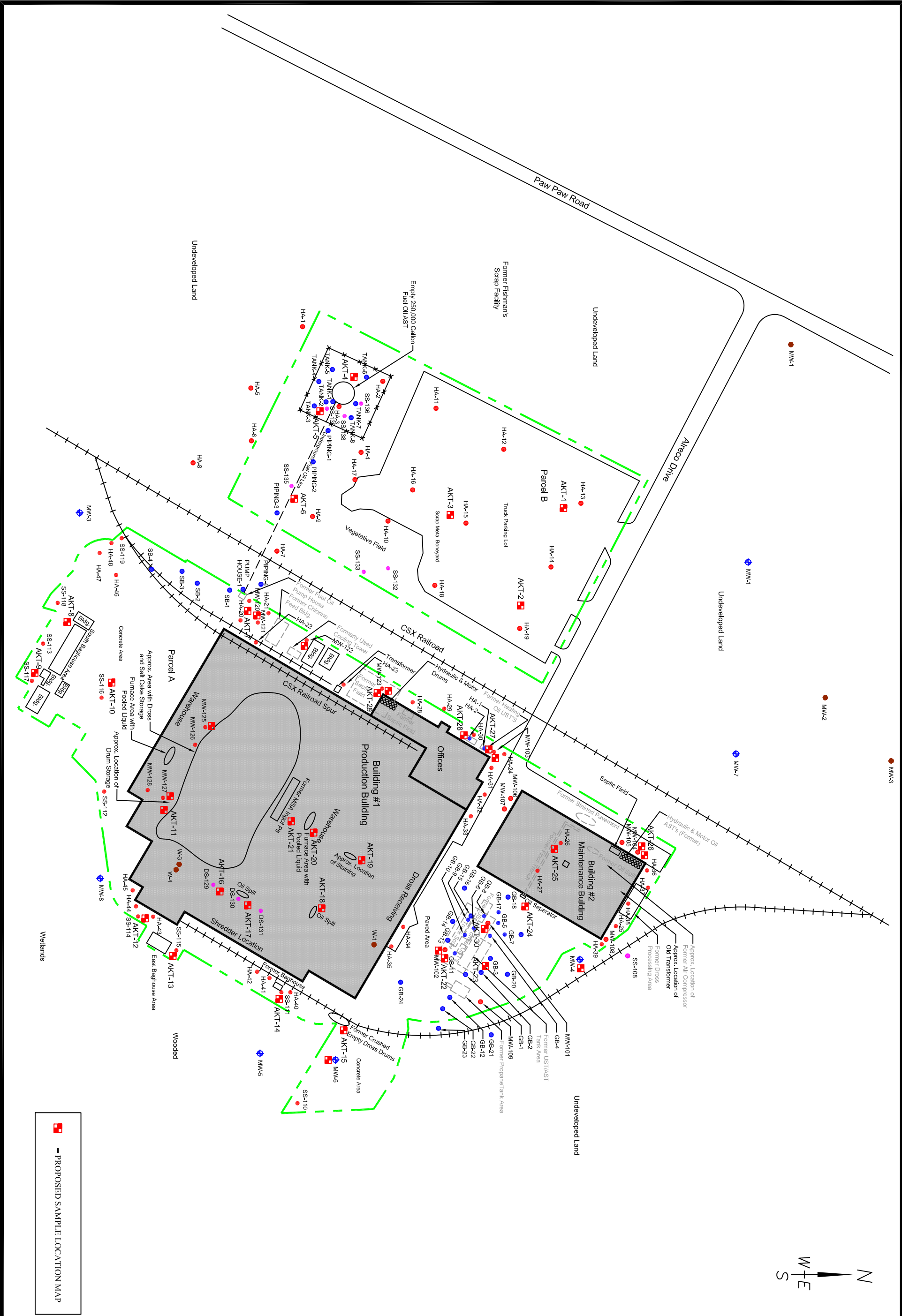
This Work Plan/SAP was prepared by AKT Peerless Environmental & Energy Services and is based on information available at the time of development of this plan, and is subject to revision as new data and information on potential health and safety hazards at the subject property becomes available.

AKT PEERLESS ENVIRONMENTAL & ENERGY SERVICES



Patrick T. Bell, PG
Senior Project Manager

FIGURE



- = PROPERTY LINE
- = PRISM SOIL BORING LOCATIONS (2005)
- = AARES SOIL BORING LOCATIONS (1997)
- = AARES MONITORING WELL LOCATIONS (1997)
- = BLDI SOIL BORING LOCATIONS (2004)
- = NOVA SOIL BORING LOCATIONS (2004)

ATTACHMENT A
HEALTH AND SAFETY PLAN



HEALTH AND SAFETY PLAN FOR ENVIRONMENTAL SUBSURFACE INVESTIGATION

AKT PEERLESS ENVIRONMENTAL & ENERGY SERVICES

The information in this Health and Safety Plan (HASP) is provided solely for the protection of the health and safety of AKT Peerless employees and subcontractors working under the direct supervision and control of AKT Peerless on this project. AKT Peerless assumes no liability for, or responsibility to, any other parties for the accuracy or completeness of the information contained herein for any use or reliance upon this HASP by any other party.

AKT PEERLESS HEALTH & SAFETY PLAN

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- B. PIR Incident Reporting Guide
- C. Lock Out/Tag Out
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- J. Site Maps

SITE EMERGENCY FORM

Contaminants of Concern: VOCs, PNAs, Metals

Minimum Level of Protection: D

Hazard Determination: Serious_____ Moderate_____ Low__X__

Do not endanger your own life. Survey the situation before taking any action.

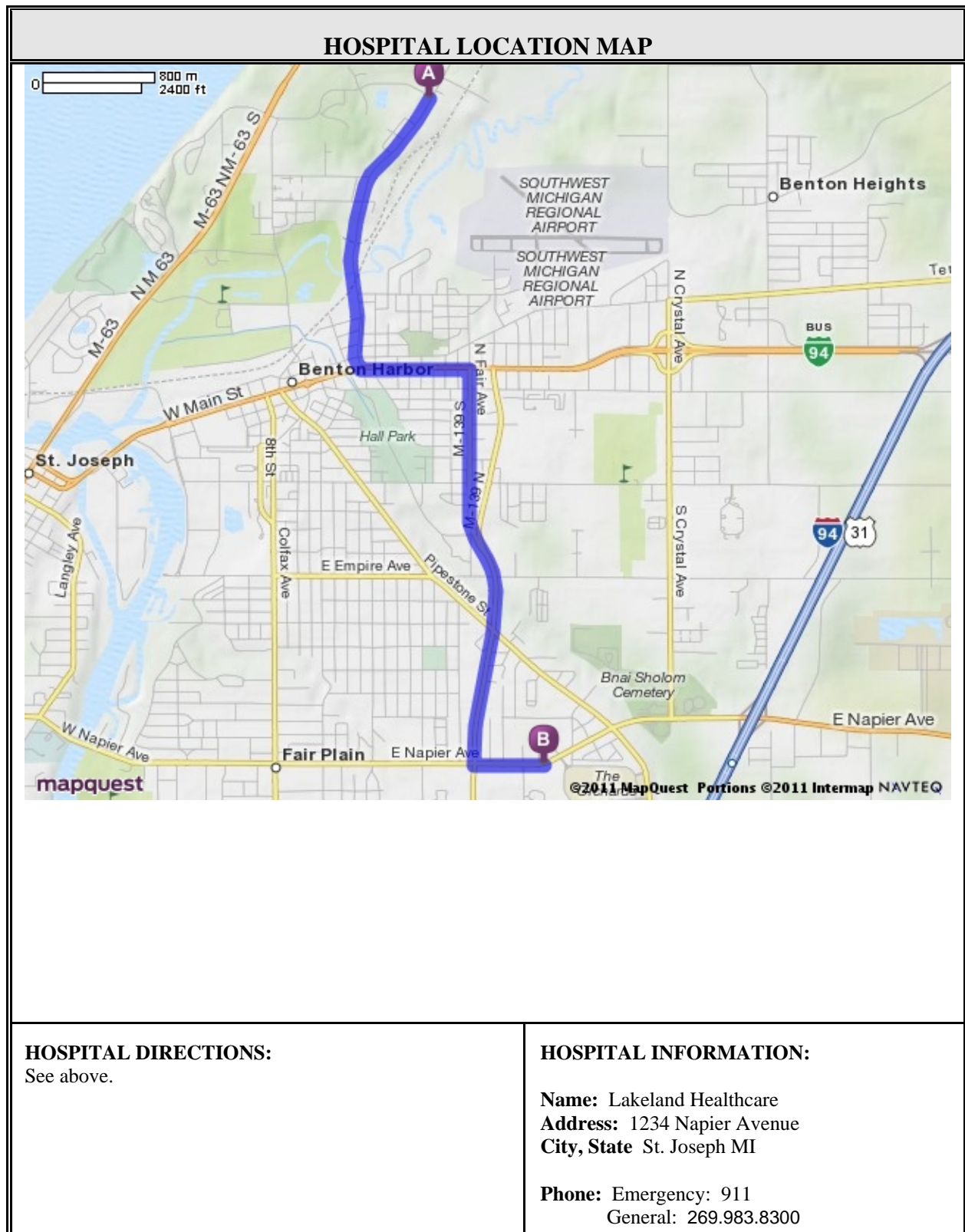
AKT PEERLESS Office Telephone	(248) 615-1333
Site Location Address	900 Alreco, Benton Harbor, Michigan
Telephone Located at	All field staff are equipped with cell phones

EMERGENCY PHONE NUMBERS: IN THE EVENT OF ANY EMERGENCY CONTACT PROJECT MANAGER (PM) OR HEALTH AND SAFETY REPRESENTATIVE.

Ambulance	911
Fire	911
Police	911
Hospital Name	Lakeland Regional Medical Center (map and driving directions are attached)
Hospital Phone Number	269-983-8262
Project Manager/Site Safety Officer	Patrick Bell – 248-497-9794
Client Contact	BHBRA – Marc Florian - (269) 927-3366

UTILITY MARKER EMERGENCY TELEPHONE NUMBERS

Utility	Color Code
Water	Blue
Gas	Yellow
Electric	Red
Telephone/Cable	Orange
Sewer	Green
Miss-Dig Telephone Number: (800) 482-7171	



EMERGENCY FIRST AID

FIRST AID

Ingestion:	DO NOT INDUCE VOMITING. Call Poison Control - follow instructions. Administer cardiopulmonary resuscitation (CPR), if necessary. Seek medical attention.
Inhalation:	Remove person from contaminated environment. Administer CPR if necessary. Seek medical attention. DO NOT ENTER A CONFINED SPACE TO RESCUE SOMEONE WHO HAS BEEN OVERCOME UNLESS PROPERLY EQUIPPED AND A STANDBY PERSON IS PRESENT.
Skin Contact:	Brush off dry material. Remove wet or contaminated clothing. Flush skin thoroughly with water. Seek medical attention if irritation persists.
Eye Contact:	Flush eyes with water for 15 minutes. Seek medical attention.
Exposure Symptoms:	Headache, dizziness, nausea, drowsiness, irritation of eyes, nose, throat, breathing difficulties.
Contingency Plan:	Report incident to PM and Health and Safety Specialist (HSS) after emergency procedures have been implemented.

RESPONDER MUST HAVE A CURRENT CERTIFICATE TO ADMINISTER FIRST AID OR CPR

1. Survey the situation. Do not endanger your own life. DO NOT ENTER A CONFINED SPACE TO RESCUE SOMEONE WHO HAS BEEN OVERCOME UNLESS PROPERLY EQUIPPED AND TRAINED. ENSURE ALL PROTOCOLS ARE FOLLOWED INCLUDING THAT A STANDBY PERSON IS PRESENT.
2. Call 911 (if available) or the fire department **IMMEDIATELY**. Explain the physical injury, chemical exposure, fire, or release.
3. Decontaminate the victim without delaying life-saving procedures.
4. If the victim's condition appears to be noncritical, but seems to be more severe than minor cuts, he/she should be transported to the nearest hospital by trained Emergency Medical Services (EMS) personnel: let the doctor assume the responsibility for determining the severity of the injury. If the condition is obviously serious, EMS must transport the victim.
5. Notify the PM and the HSS. Complete the AKT Peerless Preliminary Incident Report (PIR) within 24 hours.

EMERGENCY FIRST AID PROCEDURES	
To Stop Bleeding	CPR
<ol style="list-style-type: none"> 1. Give medical statement. 2. Assure airway, breathing, and circulation. 3. Use DIRECT PRESSURE over the wound with clean dressing or your hand (use non-permeable gloves). Direct pressure will control most bleeding. 4. Bleeding from an artery or several injury sites may require DIRECT PRESSURE on a PRESSURE POINT. Use pressure points for 30 - 60 seconds to help control severe bleeding. 5. Continue primary care and seek medical aid as needed. 	<ol style="list-style-type: none"> 1. Give medical statement. 2. Arousal: Check for consciousness. 3. Open airway with chin-lift. 4. Look, listen, and feel for breathing. 5. If breathing is absent, give 2 slow, full rescue breaths. 6. Check the pulse for 5 to 10 seconds. 7. If pulse is present, continue rescue breathing: 1 breath every 5 seconds. 8. If pulse is absent, initiate CPR; 15 compressions for each two breaths.

1.0 INTRODUCTION

This document provides health and safety controls to be used by all AKT Peerless Environmental & Energy Services (AKT Peerless) employees and subcontractors during field activities conducted as part of environmental subsurface projects.

1.1 SCOPE AND PURPOSE

This Health and Safety Plan (HASP) has been prepared to provide all AKT Peerless employees and subcontractors with protocols conducive with a safe working environment during field activities associated with environmental subsurface projects. The site tasks that will be conducted during typical subsurface investigations will include one or all of the following: 1) surveying, 2) surface geophysics, 3) aquifer characteristics testing, 4) concrete coring, 5) Geoprobe/ Hollow-stem auger soil borings, 6) monitoring well drilling and installation, 7) equipment decontamination, (8) environmental oversight, and (9) investigation derived waste collection and on-site storage. This HASP was developed to reduce the potential for personal injury, illness, and physical damage to equipment and property by stressing management responsibilities, medical surveillance, training, periodic work site evaluations and audits, accident prevention and investigation record keeping, personal protective equipment (PPE), hazard assessment criteria, site controls, decontamination procedures, and general safety requirements.

Tasks associated with environmental investigation and industrial hygiene oversight projects including assessment and removal of hazardous containers and tanks, asbestos, lead, PCB, mercury, and infectious wastes are addressed in AKT Peerless' Health and Safety Plan for hazardous materials assessment and removal projects.

This HASP has been prepared in accordance with the requirements of the following:

- 29 Code of Federal Regulations (CFR) 1910.120: *Safety and Health Regulations for General Industry*, Occupational Safety and Health Administration (OSHA), as amended December 1986.
- Department of Consumer and Industry Services (DCIS) Part 432 Hazardous Waste Operations and Emergency Response.
- Standard Operating Safety Guides, U.S. Environmental Protection Agency (EPA), 1992.
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH, Publication No. 85-115, October 1985.

All AKT Peerless and subcontractor personnel performing field activities related to AKT Peerless subsurface investigations will be provided a copy of this HASP and will be required to follow its protocols. All operations, procedures, and equipment will meet the applicable requirements of OSHA 1910 and 1926 and DCIS Part 432. All site workers will be required to acknowledge their understanding of this document by signing the Personal Acknowledgment Signature Form, which is provided in the Site-Specific HASP. **AKT Peerless claims no responsibility for use of this HASP by others.** This HASP is written for the specific use of AKT Peerless personnel, and may be amended if required.

The requirements of this plan are mandatory for all AKT Peerless personnel, AKT Peerless subcontractors, and visitors to areas controlled by AKT Peerless. **Nothing in this plan relieves subcontractors of the responsibility to provide a safe workplace for their employees.** Each subcontractor must review this plan and verify that its hazard controls are sufficient for their specific site activities. If not sufficient, the subcontractor is responsible to supplement these controls to provide adequate protection.

1.2 HEALTH AND SAFETY PERSONNEL

The organization and functions of personnel within AKT Peerless are described in the following subsections. A contact list for AKT Peerless personnel is provided in Table 1 (Refer to Site-Specific HASP for a list of site-specific Emergency contact numbers).

Table 1
Contact List for Investigation

<i>AKT Peerless Environmental & Energy Services</i>	
Tony Anthony	Cellular (248) 207-7314
Anthony Kashat	Cellular (248) 207-7206
Farmington Office (248) 615-1333	
Saginaw Office (989) 754-9896	
Detroit Office (313) 962-9353	
Lansing Office (517) 482-9227	
Chicago Office (773) 463-6767	

1.2.1 AKT Peerless Project Director

The AKT Peerless Project Director is responsible for executing all contractual obligations. This individual will ensure that AKT Peerless' full resources are accessible to the AKT Peerless Site Manager and that all staffing and administrative support needs of the project are met in a timely manner. The Project Director will play an active role in client interaction and will review all deliverables. The AKT Peerless Project Director is Mr. Tony Anthony, CP, CPG, CHMM, REPA.

1.2.2 AKT Peerless Health and Safety Manager

The AKT Peerless Health and Safety Manager (HSM) will review and internally approve this HASP. In consultation with the AKT Peerless Project Director and AKT Peerless Project Manager, this individual will ensure that an adequate level of personal protection exists for the potential site hazards for all field personnel. The HSM does not report to either the AKT Peerless Project Director or AKT Peerless Project Manager on health and safety matters; therefore, this individual's actions are not dictated by any program or project constraints (such as budget and schedule) other than the assurance of appropriate safeguards for staff conducting the investigation activities. The AKT Peerless Health and Safety Manager is Mr. Patrick T. Bell, PG.

1.2.3 Site Health and Safety Officer

The Site Health and Safety Officer (SHSO) is responsible for implementing the provisions of this HASP and ensuring that all health and safety requirements are enforced at the subject property. Prior to the initiation of field activities, the SHSO will conduct a field staff orientation and briefing to acquaint project personnel with the potential hazards and associated safety controls of the subject property. The SHSO may deviate from provisions in the HASP if extraordinary field conditions arise. The AKT Peerless Project Director will select the individual representing AKT Peerless as the SHSO prior to field activities. The SHSO also is responsible for the following health and safety controls and procedures:

- Implementation of the HASP;
- Stopping project activities and/or evacuating the site if unanticipated hazardous conditions are encountered for which project personnel are unprepared to respond or if any operation threatens employee or public health or safety;
- Conducting routine inspections to verify compliance with this HASP and notifying the HSO of violations or deviations from the HASP, or unexpected hazardous conditions;
- Conducting a daily safety meeting and tailgate briefing;
- Ensuring that employees have access to this HASP at all times;
- Maintaining site safety records;
- Coordinating emergency medical care;
- Verifying that PPE are properly used and maintained;

- Controlling entry and access to work sites; and
- Verifying that personnel (AKT Peerless employees and visitors) allowed access inside the Exclusion Zone or other controlled areas have completed the required HAZWOPER training and site briefing.

1.3 TRAINING

All AKT Peerless employees, managers, supervisors, consultants and subcontractors who conduct field activities at the subject property must have completed the initial site-specific safety training, initial Hazardous Waste Operations training course (OSHA 29 CFR 1910.120 and DCIS Part 432), and annual refresher training within the required time frame. Managers and supervisors directly responsible for site activities should complete a Supervisor Training course in addition to the initial training course and annual refresher course.

A safety meeting (“tailgate briefing”), conducted by the SHSO, will be held on-site prior to each day’s activities to reiterate the health and safety requirements or to inform site personnel of upcoming operations and safety requirements. A person who is certified in first aid and cardiopulmonary resuscitation (CPR) will be on-site with field personnel at all times.

1.4 MEDICAL SURVEILLANCE

AKT Peerless employees, who participate in field activities involving known or suspected hazardous materials, are monitored through AKT Peerless’ annual medical surveillance program. Personnel performing site work will have received a medical baseline or follow-up examination within the past 12 months. A physician’s statement declaring that all AKT Peerless field personnel are medically qualified to perform hazardous waste related activities, will be kept on file in the AKT Peerless Saginaw, Michigan office.

Subcontractor employees must participate in their employer’s medical monitoring program. Field personnel who have not received medical clearance will not be permitted into the Exclusion Zone(s).

2.0 HAZARDOUS SUBSTANCE CHARACTERIZATION

Chemical hazards of primary concern anticipated during typical investigation field activities include:

- Inhalation of vapors or dusts containing contaminants.
- Oral ingestion of contaminants.
- Dermal contact to contaminants.
- Absorption of contaminants

Controls for these hazards will be available in the vehicle or field office, where first-aid kits, eye wash kits, and PPE will be kept. Table 2 presents the occupational exposure guidelines for typical chemicals of concern.

The primary anticipated physical hazards include:

- Use of potentially hazardous drilling equipment
- Extreme weather conditions
- Working around utility lines, poles, or wires
- Working within structurally damaged buildings
- Slips, trips, and falls
- Heat stress associated with the use of impermeable clothing and/or high ambient temperatures
- Cold stress during the winter season
- Vehicular traffic
- Noise
- Mechanical Equipment
- Construction Equipment
- Electrical
- Fire and Explosion
- Confined space entry hazards

Table 2
Occupational Exposure Guidelines for
Substances Potentially Associated with Environmentally Impacted Sites

SUBSTANCE	EXPOSURE LIMITS	SYMPTOMS/WARNING PROPERTIES
Lead (Pb)	OSHA PEL = 100 ppm (0.05 mg/m ³) NIOSH = 0.100 mg/m ³ Air concentration to be maintained so that worker blood lead remains <0.060-mg/100 g of whole blood. IDLH = 700 mg/m ³	Poisonous if swallowed, inhalation of dust poisonous. Fire may produce irritating or poisonous gases.
PCBs (Arcolor 1242)	OSHA = 1mg/m ³ [Skin] IDLH = [10mg/m ³] Carcinogen	Occupational carcinogen; irritation of eyes and liver damage
PCBs (Arcolor 1254)	(OSHA) 0.5mg/m ³ [Skin] IDLH = [5mg/m ³ Carcinogen	Occupational carcinogen; irritation of eyes; acne-form dermatitis, and liver damage.
Trichloroethylene	NIOSH = 25 ppm	Poisonous if swallowed

SUBSTANCE	EXPOSURE LIMITS	SYMPTOMS/WARNING PROPERTIES
	IDLH = 1000 ppm PEL = 100 ppm	Vertigo headache if inhaled Visual distortion
Benzene	OSHA PEL = 1 ppm STEL = 5 ppm IDLH = 3,000 ppm (See personal protection level)	May be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes.
Ethylbenzene	(OSHA) PRL = 100 ppm STEL = 125 ppm IDLH = 2000 ppm (See personal protection level)	Contact may cause irritation or burn skin and eyes, may be poisonous if absorbed through skin. Vapors may cause dizziness or suffocation.
Toluene	OSHA/NIOSH PEL = 100 ppm STEL = 150 ppm IDLH = 2000 ppm 10 Hr. TWA 200 ppm 10 min. ceil 0 ppm at breathing zone without respiratory protection (see personal protection level)	May be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes.
Xylene	OSHA PEL = 10 ppm (435 mg/m ³) (NIOSH) 100 ppm 10 Hr. TWA 200 ppm 10 min. ceil 0 ppm at breathing zone without respiratory protection (See personal protection level)	May be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may burn skin and eyes.
Cadmium (Cd)	OSHA PEL = 0.2 mg/m ³ for dust and = 0.1 mg/m ³ for fume NIOSH - Carcinogen IDLH = Carcinogen (50 mg/m ³ for dust) (9 mg/m ³ for fumes)	Inhalation and ingestion may cause pulmonary and edema, dyspnea, cough, chest tight, substernal pain, headache, chills, muscle aches, nausea, vomit, diarrhea, anosmia, emphysema, proteinuria, mild anemia.
Chromium (Cr)	OSHA PEL = 1 mg/m ³ NIOSH = 0.5 mg/m ³	Inhalation and ingestion may cause histologic fibrosis of lungs.
Naphthalene	OSHA PEL = 10 ppm STEL = 15 ppm IDLH =- 500 ppm	Eye irritation, headache, confusion, excitement, nausea, profuse sweating, dermatitis are some of the symptoms.
Other PNAs (See coal or tar pitch) benzo(a)pyrene, phenanthrene, chrysene, anthracene, and pyrene	OSHA PEL = 0.2 mg/m ³ IDLH = [700 mg/m ³] Carcinogen	Carcinogen, Dermatitis, bronchitis
Cyanide	OSHA/NIOSH = 5 mg/m ³	Inhalation might cause Asphyxia and possible death; Irritation of eyes and

SUBSTANCE	EXPOSURE LIMITS	SYMPTOMS/WARNING PROPERTIES
	(4.7 ppm) [10 min.] IDLH = 50 mg/m ³	skin, nausea and headaches
Asbestos (dusts)	NIOSH/OSHA = 0.1 fiber/cc, longer than 5 μ m, over 8 hrs.	Carcinogen, respiratory and eye irritant. Inhalation hazard.
Arsenic	OSHA = 0.01 mg/m NIOSH = 0.002 mg/m ³ Carcinogen IDLH = 100 mg/m ³	Inhalation may cause ulceration of nasal septum
Tetrahydrofuran	NIOSH/OSHA = 590 mg/m ³ IDLH = 20,000 ppm	Inhalation may cause upper respiratory irritation. Skin/eye contact; nausea, dizziness, and headache.
Mercury (vapor)	NIOSH/OSHA = 0.05 mg/m ³ (skin) IDLH = 28 mg/m ³	Cough, chest pain, dyspnea
Selenium	(NIOSH/OSHA) 0.2 mg/m ³	Inhalation may cause irritation of eyes, nose and throat; ingestion will cause fever or dyspnea
Zinc (as oxide form)	NIOSH/OSHA = 5 mg/m ³	Inhalation may cause dry throat, cough or fever
Chloroform	OSHA = 2 ppm (9.78 mg/m ³) Carcinogen IDLH = 1000 ppm	Inhalation may cause dizziness, mental dullness and nausea; contact may cause irritation of eyes and skin

3.0 SITE CONTROL

3.1 WORK ZONES

The appropriate measures for coordinating road access for drilling/probing equipment and other heavy equipment will be determined by the SHSO. Work zones will not be necessary for surface soil sample collection, geophysical surveys, land surveying or other activities where exposure to contamination is unexpected.

Work areas will be divided into three zones. The immediate working area (within 10 feet of sampling mechanism) requiring environmental evaluation will be considered an *Exclusion Zone*, with surrounding areas (up to 25 feet of sampling mechanism) serving as a *Support Zone*, and an intervening area for decontamination designated as a *Contamination Reduction Zone* (CRZ). Zones may be altered by the SHSO dependant upon field conditions (i.e., wind direction, new source identification, etc.).

3.1.1 Exclusion Zone

The intent of the exclusion zone is to isolate the area of field investigation activity and to minimize the spread of contamination to support areas and/or off-site locations. Personnel entering the Exclusion Zone must be wearing the prescribed level of protection, and be

authorized to enter the Exclusion Zone. Personnel, equipment, and/or materials exiting the Exclusion Zone will be considered contaminated; personnel clothing, equipment, and materials will be decontaminated or containerized, according to procedures described in Section 6.0 of the AKT Peerless HASP.

3.1.2 Contamination Reduction Zone (CRZ)

The CRZ is the area that begins at the “hot line” for the Exclusion Zone and continues to the contamination control line (CCL). The CRZ is a transitional zone between property investigation areas (i.e., soil boring locations) and the Support Zone. When personnel, equipment, or materials cross the “hot line,” they are assumed to be affected by investigation activities.

A contamination reduction corridor (CRC), which includes brushes, detergents, containers, and water necessary for full personnel and portable equipment decontamination, will be located within the CRZ, if necessary. A separate control facility will be established for heavy equipment decontamination needs, if required. In addition, safety equipment (e.g. emergency eyewash, fire extinguisher, and first-aid kit) will be staged in this zone, typically within the AKT Peerless field vehicle or site trailer (if available). The CRC will be located upwind whenever possible.

A CRZ will be used only in cases where high concentrations of contaminated material have collected on personnel and/or equipment. In areas where low contamination is detected, only an exclusion zone will be used.

3.2 SUPPORT ZONE

The Support Zone (i.e., the outermost zone of site investigation activities) is separated from the CRZ (if used) by the CCL and is considered a clean area. Movement of personnel and materials from the Support Zone into the CRZ is generally unrestricted except as required through access points controlled for administrative purposes. However, only uncontaminated/decontaminated personnel or materials may enter this zone. The Support Zone will serve as the communication center and source of emergency assistance to operations occurring in the Exclusion Zone and CRZ (if used). The SHSO will maintain a record of each person entering or visiting the Support Zone. A sign in/out log will track workers and visitors, establish exposure times, and establish a head count in the event of an emergency.

3.3 SITE SECURITY

To enhance security during nonworking hours, the SHSO will secure equipment and supplies in locked facilities, and open boreholes and excavations will be covered and properly secured or fenced.

3.4 SPILL CONTAINMENT PROGRAM

The activities covered in this HASP, with the exception of steam cleaning operations (i.e., decontamination of drill rig, Geoprobe, heavy equipment, etc.), are not expected to generate significant quantities of liquid waste.

A spill containment program will be implemented during all field activities that meets drum and container handling requirements in accordance with 29 CFR 1910.120. Hazardous substances and high level contaminated soils, liquids, and other residues (i.e., exceeding 40 CFR criteria) also will be handled, transported, labeled, and disposed of in accordance with 29 CFR 1910.120. If a major spill occurs, AKT Peerless will contact the local Fire Department [911] immediately, and if possible, will implement controls to contain and isolate the spilled substance.

Prevent problems by documenting the location of underground lines (e.g., product, sewer, telephone) before starting site work. If you drill through a line or tank or another leak occurs, document the spill/release in writing. Include dates, times, actions taken, agreements reached, and names of people involved. In the event of a spill/release, follow this plan.

1. Wear appropriate PPE; stay upwind of the spill/release.
2. Turn off equipment and other sources of ignition.
3. Turn off pumps and shut valves to stop the flow/leak.
4. Plug the leak or collect drippings in a bucket, when possible.
5. Place sorbent pads to collect product, if possible.
6. Call Fire Department immediately if fire emergency develops.
7. Inform AKT PEERLESS PM about the situation.
8. Determine if the client wants to repair the damage or if the client will use an emergency repair contractor.
9. Based on agreements, contact emergency spill contractor for containment of free product.
10. Advise the client of spill discharge notification requirements and determine who will complete and submit forms. Do not submit or report to agencies without the client's consent. Document each interaction with the client and regulators and note, in writing; name, title authorizations, refusals, decisions, and commitments to actions.
11. Do not transport or approve transportation of contaminated soils or product until proper manifests have been completed and approved. Be aware that soils/product may meet criteria for hazardous waste.
12. Do not sign manifests as generator of wastes; contact the regional compliance manager to discuss waste transportation.

A notification of a spill/release requires completion of a PIR and Class III notification. The PM must contact the client or generator. The generator is under obligation to report to the proper government agencies. If the spill extends into waterways, the Coast Guard and the National Response Center ([800] 424-8802) must be notified immediately by the client or with their permission.

4.0 WORK PRACTICES AND PERSONAL PROTECTIVE EQUIPMENT

4.1 WORK PRACTICES

AKT Peerless staff and subcontractors will adhere to the established safe work practices for their respective specialties (e.g., drilling, coring). The need to exercise caution in the performance of specific work tasks is made more acute due to weather conditions, restricted mobility, and reduced peripheral vision caused by the protective gear itself/ the need to maintain the integrity of the protective gear; and the increased difficulty in communicating caused by wearing air-purifying respirators (APRs). Fieldwork at the areas requiring environmental evaluation will be conducted considering the safety and health of those involved. Important principles for working at the subject property include the following:

- In any unknown situation, always assume the worst conditions and plan responses accordingly.
- Employ the buddy system during all field activities conducted within an Exclusion Zone or areas where injured personnel would not be noticed and aided by field personnel at the subject property. Under no conditions will any person be permitted to enter an Exclusion Zone alone. Communication between personnel will be established and maintained at all times and will include the use of hand signals during respirator deployment (if needed).
- Smoking, eating, or drinking will not be permitted in the Exclusion Zone or CRZ.
- Work breaks will be scheduled to prevent heat stress-related accidents, fatigue, or illnesses.
- If Level C protection or above is required, facial hair must be removed to allow for proper respirator fit.
- AKT Peerless personnel should be aware that chemical constituents might mimic and/or enhance symptoms of other illnesses or intoxication.
- AKT Peerless personnel should be observant of not only one's own immediate surroundings, but also those of others. All field personnel will be working under constraints, therefore, a team effort is needed to notice and warn of impending dangerous situations. Extra precautions are necessary when working near heavy equipment and while using PPE because of vision, hearing and communication may be restricted.
- The SHSO will maintain Daily Activity Reports, recording daily activities, meetings, incidents, and data relating to the project on applicable forms, or in personal field book. This information will remain on-site during the full duration of the project so that other personnel may add information in the same record book.

In addition to these work principles, Table 3 lists the general procedures and practices to follow to prevent injury or illness. Appropriate training for specific hazards must be completed by field personnel prior to initiating work activities. Precautions must be taken to prevent injuries and exposures to the following potential hazards. For additional information, refer to the Health and Safety Policies and Procedures, or consult with your health and safety professional.

Table 3
Procedures and Practices to Follow to Prevent Injury or Illness

Potential Hazard	Control
<p>Exposure to Chemical Products</p> <p>(See Appendix D: MSDS Definitions and MSDSs)</p>	<ol style="list-style-type: none"> 1. Stand up-wind of chemical products whenever possible. 2. Minimize direct contact and contact time with contaminated media to prevent exposure. 3. Avoid walking through discolored areas, puddles, leaning on drums, or contacting anything that is likely to be contaminated, unless wearing the appropriate PPE. 4. Do not eat, drink, smoke, and/or apply cosmetics in the hot or warm zones. 5. Wear appropriate PPE when it is required to come in contact with contaminated media or surfaces. 6. Level D PPE must be worn as a minimum when on project site. 7. >5 parts per million (ppm) organic vapors, sustained for 5 minutes, in breathing zone requires upgrade to Level C. 8. > 5 ppm organic vapors, sustained for 5 minutes, in breathing zone requires upgrade from Level C to Level B. 9. If unknown materials are encountered, call the HSR.
<p>Exposure to OSHA Defined Hazardous Materials</p> <p>(See Appendix D: MSDS Definitions and MSDSs)</p>	<ol style="list-style-type: none"> 1. All chemicals brought on-site by AKT PEERLESS personnel or their subcontractors, such as pipe glues, solvents, reagents, decontamination solutions, or any other OSHA defined hazardous material must be adequately labeled and the MSDSs available on-site. 2. MSDSs brought on-site can be attached in Appendix E or in the MSDS binder that is kept in the company vehicle. 3. Training on OSHA defined hazardous materials must be completed and documented.
<p>Erecting Temporary Structure or Working From Aerial Lift</p>	<ol style="list-style-type: none"> 1. Wear leather gloves while attaching support members to protect against pinching injuries. 2. While working from elevated levels greater than 6 feet, ensure that all employees have 100% fall protection with full body harnesses and guardrails. 3. Do not stand under loads that are being raised or lowered with cranes or aerial lifts. 4. Conduct pre-operational inspection of aerial lifts to include: tire air pressure, hydraulic fuel level and pressure check, make sure pivot pins are secured, check hoses for worn areas, check for cracks or deviations in welded parts, the safety limit switch should work freely, security of the guardrail system on the platform, check both ground and platform control functions, raise and lower each boom system separately, listen for any unusual noises, vibrations, or uneven operations. 5. Maintain a safe distance of 20 feet from unguarded overhead power lines. 6. Conduct site evaluation to determine proper positioning for the unit. Make sure surface is level. Cordon off holes, drop-offs, bumps or weak ground surfaces.

Potential Hazard	Control
	<ol style="list-style-type: none"> Never climb a raised platform or stand on the mid-rail or top-rail. Tools should always be hung or put into a belt whenever possible.
Exposure to Surface/ Subsurface Airborne Dust	<ol style="list-style-type: none"> Stand up-wind whenever intrusive activities occur and generate visible signs of airborne dust. Monitor air for airborne soil dust (surface or subsurface soil) with portable aerosol dust-direct reading instrument. >2.5 mg/M³ in breathing zone requires upgrade to Level C. >50 mg/M³ in breathing zone requires upgrade to Level B. Approval for Level B must first be approved by HSR. Utilize wet methods (spraying ground, wet drilling, etc.) when visible signs of airborne dust are generated.
Vehicular Traffic	<ol style="list-style-type: none"> Wear traffic safety vest when vehicle hazard exists. Use cones, flags, barricades, and caution tape to define work area. Use vehicle to block work area. Engage police detail for high-traffic situations.
Fall Protection	<ol style="list-style-type: none"> Assess the work to determine if there is a potential for falling. Make a determination of the distance of the potential fall. A fall protection system must be used for potential falls greater than 6 feet. Consult a competent person, such as the HSR, regarding the applicability requiring fall protection and what type of protection systems should be used. Inspect all fall protection equipment and anchoring points prior to their use. Ensure Fall Protection training for applicable employees is completed prior to initiating work activities.
Confined Space Entry (CSE)	<ol style="list-style-type: none"> Ensure personnel assigned meet CSE training requirements. Complete CSE Hazard Analysis Form in Appendix G. Complete CSE permit. Post sign. Ensure pre-entry CSE safety meeting is conducted. Remove vault cover using proper lifting techniques. Promote natural ventilation by opening the space to fresh air, if needed utilize mechanical purge ventilation. Conduct remote air monitoring prior to entry. Attendant can act as CSE Supervisor and must be present at CSE entry point all times when entrant is in CSE. Access work for fall hazards and ensure provisions for non-entry rescue have been met. Enter only when safe; conduct continuous air monitoring.
Installation and Operation of Soil Vapor Extraction (SVE) System	<ol style="list-style-type: none"> Competent person must be present during excavation/trenching activities; follow procedures in Appendix F. SVE effluent pipe and galvanized steel SVE pipes from thermal

Potential Hazard	Control
	<p>SVE wells are "HOT" and must be labeled to prevent skin burns.</p> <ol style="list-style-type: none"> LO/TO points must be identified for blower motors and specific LO/TO procedures followed as listed in Appendix C. Monitor for chemicals of concern with appropriate monitoring equipment when possibility of exposure occurs such as during emission monitoring activities or system maintenance. Follow air monitoring schedule and action levels in Table 7 of this HASP.
Exposure to Surface/ Subsurface Airborne Dust	<ol style="list-style-type: none"> Stand up-wind whenever intrusive activities occur and generate visible signs of airborne dust. Monitor air for airborne soil dust (surface or subsurface soil) with portable aerosol dust-direct reading instrument. >2.5 mg/M³ in breathing zone requires upgrade to Level C. >50 mg/M³ in breathing zone requires upgrade to Level B. Approval for Level B must first be approved by HSR. Utilize wet methods (spraying ground, wet drilling, etc.) when visible signs of airborne dust are generated.
Installation and Operation of Hot Air Injection System	<ol style="list-style-type: none"> Competent person must be present during excavation/trenching activities. Follow procedures in Appendix F. Use hot work permit and procedures in Appendix when welding steel pipe. Label high temperature surfaces as "HOT." Identify LO/TO points and complete procedures as listed in Appendix C. Conduct air monitoring for chemicals of concern with appropriate monitoring equipment at effluent exhaust points. Follow air monitoring action levels in Table 7 of this HASP.
Installation and Operation of Air Sparge System	<ol style="list-style-type: none"> Competent person must be present during excavation/trenching activities. Follow procedures in Appendix F. Use hot work permit and procedures in Appendix H when welding, cutting, or torching. Ensure air delivery piping system has been leak tested prior to operation. Follow LO/TO procedures using form in Appendix C during maintenance operations.
Installation, Operation, and Maintenance of High Vacuum Dual-Phase Extraction (HVDPE) System	<ol style="list-style-type: none"> Competent person must be present to supervise and evaluate excavation and trenching activities. Fall protection equipment (harness and lifeline) must be used during construction of remediation shed that requires work above 6 feet in height. LO/TO points must be identified for vacuum motors and specific LO/TO procedures followed as listed in Appendix C. Monitor for aromatic and chlorinated compounds with a photoionization detector (PID) (10.2 eV lamp)/flame ionization detector (FID) when possibility of exposure occurs such as during emission monitoring or system maintenance activities. Follow air monitoring schedule and action levels listed in

Potential Hazard	Control
	<p>Table 6.</p> <ol style="list-style-type: none"> 5. Ensure product recovery vessels are labeled for hazard communication requirements. 6. Conduct noise monitoring during HVDPE operation to determine hearing conservation program requirements.
Inclement Weather	<ol style="list-style-type: none"> 1. Stop outdoor work during electrical storms and other extreme weather conditions such as extreme heat or cold temperatures. 2. Take cover indoors or in vehicle. 3. Listen to local forecasts for warnings about specific weather hazards such as tornados, hurricanes, and flash floods.
Installation and Operation of Ozone (O ₃) Sparge System	<ol style="list-style-type: none"> 1. Competent person must be present during excavation/trenching activities. Follow procedures in Appendix F. 2. Use hot work permit and procedures in Appendix H when welding, cutting, or torching. 3. Ensure O₃ delivery piping system has been leak tested with helium prior to generating O₃. 4. Conduct real time air monitoring for O₃ during activities where employees are in close proximity to O₃ generator or discharge points. Follow air monitoring guidelines and action levels in Table 7.
Drum Excavation/Handling/Staging	<ol style="list-style-type: none"> 1. Assess scope of work to determine field personnel capabilities. Utilize subcontractors who specialize in unknown drum excavation when in doubt. 2. Initial activities for unearthing buried drums must be conducted in Level B PPE. Downgrade in PPE based on air monitoring results and or site assessment conditions. 3. Do not approach or disturb bulging drums - allow heavy equipment to handle. 4. Enter excavated area <u>only</u> after assessment by competent person and/or approval by SHSO. 5. Follow safe lifting guidelines and use mechanical aids when lifting/moving drums.
Compressed Gas Cylinder Excavation/Handling/Staging	<ol style="list-style-type: none"> 1. Assess scope of work to determine field personnel capabilities. Utilize subcontractors who specialize in compressed gas cylinder excavation/removal when in doubt. 2. Initial activities for unearthing buried compressed gas cylinders require Level B PPE. Downgrade in PPE based on air monitoring results and or site assessment conditions. 3. Exhibit caution around compressed gas cylinders that are bent dented or severely corroded. 4. Leave area immediately if signs of gas release occurs such as hissing sounds or visible signs of gas release such as vapor clouds. 5. Use safe lifting techniques and mechanical equipment to move compressed gas cylinders.
Ionizing Radiation	<ol style="list-style-type: none"> 1. Initial site survey activities for (list activity) require a field survey for screening of possible ionizing radiation.

Potential Hazard	Control
	<ol style="list-style-type: none"> Level of protection to be worn in areas suspected of containing ionizing radiation is Level Modified Level D, C, and B. A Geiger-Mueller (GM) counter with pancake probe is the preferred field instrument for radiation surveys. Areas where twice (2X) background levels of radiation, sustained for 1 minute, are encountered are to be identified/marked, and the PM, SHSO or HSR contacted. Leave work areas where ionizing radiation survey levels reach twice (2X) background, sustained for 1 minute.
Utility Lines Contact	<ol style="list-style-type: none"> Contact Dig Safe to have utility lines marked prior to excavation/trenching Refer to site drawings or customer interviews if on private property for utility locations. Hand dig 3 to 5 feet down and 5 feet each side of utility marker to avoid breaking utility lines. Refer to Appendix F for Underground Utility Contact Prevention Management Plan.
Noise	<ol style="list-style-type: none"> Wear hearing protection when equipment such as a drill rig, jackhammer, cut saw, air compressor, blower, or other heavy equipment is operating on the site. Wear hearing protection whenever you need to raise your voice above normal conversational speech due to a loud noise source; this much noise indicates the need for protection. Hearing protection is required when measured sound pressure levels (SPL) exceed 85 dB(A) where employees stand or conduct work. Conduct noise monitoring of suspected high noise operations at the beginning of the workday or start up of new operations to verify noise control/hearing protection requirements. See to Appendix E for the Noise Monitoring Form.
Electric Shock	<ol style="list-style-type: none"> Maintain appropriate distance from overhead utilities; 20-foot minimum clearance from power lines required; 10-foot minimum clearance from shielded power lines. Use ground-fault circuit interrupters as required. Perform LO/TO procedures (Appendix C). Use three-pronged plugs and extension cords. Contact your local underground utility-locating service. Follow code requirements for electrical installations in hazardous locations.
Physical Injury	<ol style="list-style-type: none"> Wear hard hats and safety glasses when on-site. Maintain visual contact with the equipment operator and wear orange safety vest when heavy equipment is used on-site. Avoid loose-fitting clothing (driller and driller's helper). Prevent slips, trips, and falls; keep work area uncluttered. Keep your hands away from moving parts (i.e., augers). Test the emergency shut-off switch on the drill rig daily.

Potential Hazard	Control
Back Injury	<ol style="list-style-type: none"> 1. Use a mechanical lifting device or a lifting aid where appropriate. 2. If you must lift, plan the lift before doing it. 3. Check your route for clearance. 4. Bend at the knees and use leg muscles when lifting. 5. Use the buddy system when lifting heavy or awkward objects. 6. Do not twist or jerk your body while lifting.
Heat Stress	<ol style="list-style-type: none"> 1. Increase water intake while working. 2. Minimize and/or avoid alcohol intake the night before working in heat stress situations. 3. Increase number of rest breaks and/or rotate workers in shorter work shifts; take breaks in shaded areas. 4. Watch for signs and symptoms of heat exhaustion and fatigue. 5. Plan work for early morning or evening during hot months. 6. Use ice vests when necessary. 7. Rest in cool, dry areas. 8. In the event of heat stroke, bring the victim to a cool environment and initiate first aid procedures. Refer to Appendix I.
Cold Stress	<ol style="list-style-type: none"> 1. Take breaks in heated shelters when working in extremely cold temperatures. 2. Remove the outer layer of clothing and loosen other layers to promote evaporation of perspiration, upon entering the shelter. 3. Be aware of cold stress symptoms such as shivering, numbness in the extremities, and sluggishness. 4. Drink warm liquids to reduce the susceptibility to cold stress. Refer to Appendix I.
High Crime Areas	<ol style="list-style-type: none"> 1. Be aware of surroundings. 2. Use the buddy system. 3. Request police detail when appropriate.
Insects	<ol style="list-style-type: none"> 1. Tuck pants into socks. 2. Wear long sleeves. 3. Use insect repellent. 4. Avoid contact by always looking ahead to where walking, standing, sitting, leaning, grabbing, lifting, or reaching-in-to. 5. Check for signs of insect/spider bites, such as redness, swelling, and flu-like symptoms. 6. Use buddy system to check each other for signs of insect/spider bites. 7. Remove ticks immediately with fine tipped tweezers by grasping the tick as close to your skin as possible and gently pulling straight out. Do not squeeze the tick's body as this may inject fluids into you. Wash the bite area of skin and apply antiseptic.
Poisonous Plants (Such as Poison Ivy,	<ol style="list-style-type: none"> 1. Don't enter areas infested with poisonous plants.

Potential Hazard	Control
Oak or Sumac)	<ol style="list-style-type: none"> 2. Immediately wash any areas that come into contact with poisonous plants. 3. Protect exposed skin area with gloves and Tyvek® suits. 4. Be aware that the oil from the plant can be carried on boots, clothes, and equipment. Always protect skin from contact. 5. If you have known or suspected allergies, carry an Epi-Pen at all times and notify co-workers that you are allergic.
Poisonous Snakes	<ol style="list-style-type: none"> 1. Avoid walking in areas where snake may nest or hide. Always look ahead to where walking for signs of snakes. 2. Use extreme caution when moving or lifting objects that could be used by snakes as cover. 3. Never reach under or behind objects or into other areas where snakes may hide. 4. Wear sturdy leather boots.
Ladders	<ol style="list-style-type: none"> 1. Assess work areas for fall hazards. 2. Make sure ladder rungs are sturdy and free of cracks. 3. Use ladders with secure safety feet. 4. Pitch ladders at a 4:1 ratio. 5. Secure ladder at the top or have another person at the bottom to help stabilize it. 6. Do not use ladders for access to air stripper towers. 7. Use non-conductive ladders near electrical wires.
Fire Control	<ol style="list-style-type: none"> 1. Smoke only in designated areas. 2. Keep flammable liquids in closed containers. 3. Keep site clean; avoid accumulating combustible debris such as paper. 4. Follow Hot Work Safety Procedures when welding or performing other activities requiring an open flame. 5. Isolate flammable and combustible materials from ignition sources. 6. Ensure fire safety integrity of equipment installations.
Static Electricity	<ol style="list-style-type: none"> 1. Do not create static discharge in flammable atmospheres. 2. Electrically bond and ground pumps transfer vessels, tanks, drums, bailers, and probes when moving liquids. 3. Electrically bond and ground vacuum trucks and the tanks they are emptying. 4. Do not splash fill containers with flammable liquids.

Potential Hazard	Control
Drilling/Boring Operations	<ol style="list-style-type: none"> 1. Driller and helper must be present during all active operations. 2. Driller helper and other site personnel must know location of emergency shut off switch. 3. Ensure jewelry is removed, loose clothing is buttoned, and loose PPE is secured close to the body to avoid getting caught in moving parts. 4. Unauthorized personnel must be kept clear of drilling rig. 5. Area of drilling operation must be cordoned off/barricaded. 6. When hazardous conditions are deemed present, operation must be shut down. 7. Do not allow drillers to climb to mast while it is erected. 8. Pipe, drill rods, casing, augers, and similar drilling tools should be orderly stacked on racks or sills to prevent spreading, rolling or sliding. 9. Work areas, platforms, and walkways should be kept free of materials, debris, and obstructions such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous. 10. Shut down drill rig to make repairs or adjustments to drill rigor to lubricate fittings. Release all pressure on the hydraulic systems, the drilling fluid system, and the air pressure systems of the drill rig prior to performing maintenance. 11. For start-up, all gear boxes must be in neutral, all hoist levels are disengaged, all hydraulic levers are in the correct non-actuating positions and the cathead rope is not on the cathead before starting a drill rig engine. 12. Do not drive the drill rig from hole to hole with the mast in the raised position. Before raising the mast, check for overhead obstructions. 13. If it is necessary to drill within an enclosed area, make certain that exhaust fumes are conducted out of the area. 14. Clean mud and grease from your boots before mounting a drill platform. Watch for slippery ground when dismounting from the platform. 15. Should the rope “grab” the cathead it could become tangled in the drum. Release the rope and sound an appropriate alarm for all personnel to rapidly back away and stay clear. 16. Always maintain a minimum clearance of 18 inches between the operating hand and the cathead drum when driving samplers, casing, or other tools with the cathead and rope method. 17. Use a long handle shovel to move auger cuttings away from the auger.

Potential Hazard	Control
Reacting to Drill Rig Contacting Electricity	<ol style="list-style-type: none"> 1. Under most circumstances, the operator and other personnel on the seat of the vehicle should remain seated and not leave the vehicle. Do not move or touch any part of the vehicle. 2. If it is determined that the drill rig should be vacated, then all personnel should jump clear as far as possible from the rig. Do not step off, and do not hang on to the vehicle when jumping clear. 3. IF ON THE GROUND, STAY FAR AWAY FROM THE VEHICLE AND THE DRILL RIG, DO NOT LET OTHERS GET NEAR THE VEHICLE AND THE DRILL RIG AND SEEK ASSISTANCE FROM LOCAL EMERGENCY PERSONNEL. 4. When the victim is completely clear of the electrical source and is unconscious and a heartbeat cannot be detected, begin CPR immediately.
Off-Road Movement of Drill Rig	<ol style="list-style-type: none"> 1. Before moving a drill rig, walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles. 2. Check the complete drive train of a carrier at last weekly. 3. Discharge all passengers before moving a drill rig on rough or hilly terrain. 4. Engage the front axle for 4x4, 6x6, etc. when traveling off highway on hilly terrain. 5. Use caution when traveling side-hill. 6. Cross obstacles such as logs and erosion channels or ditches squarely. 7. Use a spotter when lateral or overhead clearance is close. 8. After drill rig has been moved to a new spot, set the brake and/or locks. When grades are steep, block the wheels.
Safety During Rotary and Core Drilling	<ol style="list-style-type: none"> 1. Check water swivels and hoisting plugs for frozen bearings prior to use. 2. The capacities of hoist and sheaves should be checked against the anticipated weight to the drill rod string plus other expected hoisting loads. 3. Only the operator of the drill rig should brake or set a manual chuck so that rotation of the chuck will not occur prior to removing the wrench from the chuck. 4. Drill rods should not be braked during lowering into the hole with drill rod check jaws. 5. Do not lower drill rods into the hole using pipe wrenches. 6. Do not use your hands to catch a falling rod in the hole. 7. In the event of a plugged bit or other circulation problem, the high pressure in the piping and hose between the pump and the obstruction should be relieved or bled before braking the first tool joint. 8. Do not use your hands to clean drilling fluids from rods. 9. Secure the ends of drill rod sections for safe vertical storage or lay the rods down.

Potential Hazard	Control
Well Installation, Well Development, Well Gauging, Well Bailing, Soil/Ground- water Sampling	<ol style="list-style-type: none"> 1. Wear appropriate PPE to avoid skin, eye, and inhalation contact with contaminated groundwater and/or soil. 2. Stand upwind when conducting tasks and minimize possible inhalation exposure; especially when first opening monitoring wells. 3. Conduct air monitoring to determine level of respiratory protection. 4. Utilize engineering controls such as portable venturi air movers to draw away or blow away chemical vapors.
Rapid Response	<ol style="list-style-type: none"> 1. Ensure emergency response activities have been completed prior to beginning rapid response field activities. 2. Conduct hazard assessment of project site and communicate findings through a "Daily Tailgate Safety Meeting" to all AKT PEERLESS employees and subcontractors prior to beginning rapid response field activities. 3. Communicate applicable AKT PEERLESS health and safety programs to other contractors on site that may be impacted and coordinate field activities with them.
Welding, Cutting, Brazing	<ol style="list-style-type: none"> 1. Conduct fire safety evaluation. 2. Complete Hot Work Permit (Appendix H). 3. Ensure flammable materials are protected from hot work, sources of ignition. 4. Ensure fire watch/fire extinguisher is on standby by hot work location.
Cleaning Equipment	<ol style="list-style-type: none"> 1. Wear appropriate PPE to avoid skin and eye contact with isopropyl alcohol, alconox, or other cleaning materials. 2. Stand upwind to minimize any potential inhalation exposure. 3. Dispose of spent cleaning solutions and rinses accordingly.
First aid kit, blood borne pathogen kit, emergency eye wash/shower station, fire extinguisher and absorbent pads will be located on-site, either in the decontamination zone, or in the AKT PEERLESS company vehicle.	

4.2 CHEMICAL HANDLING PROCEDURES

Personnel must practice the chemical-specific handling procedures outlined below.

Table 4
CHEMICAL HANDLING PROCEDURES

Chemical	Description	Procedures
Aids and Bases Acids: including hydrochloric, nitric, and sulfuric acids Bases: including sodium hydroxide	Extremely corrosive materials with a variety of uses.	<ul style="list-style-type: none"> Wear gloves and eye-splash protection while using acid dispensed from a small dropper bottle during water sampling. Wear a full-face, air-purifying respirator equipped with combination cartridges (organic vapor/acid gas) as well as Tyvek® coveralls and nitrile and/or nitrile butyl rubber (NBR) gloves for large volume applications. Have an eye wash bottle or portable eye wash station on-site. Cap all drums after dispensing chemicals. Do not add anything into a virgin chemical drum, including unused product. Avoid mixing strong acids and bases. Consult HSR for task-specific evaluation. If mixing is absolutely necessary, do it slowly. Avoid vapors or fumes that are generated. When diluting acids, add the acid to water in small quantities and mix cautiously. When diluting bases, add water to the base in small quantities and mix cautiously.
Activated Carbon	Granular adsorbent medium used to remove residual hydrocarbons from water and/or air.	<ul style="list-style-type: none"> Use respiratory protection when activated carbon creates a dusty environment. Avoid using Activated Carbon Filter Beds for Ketone Solvents - an exothermic reaction can develop over time and result in possible explosion. Contact HSR for task-specific evaluation.

4.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal protection requirements for all personnel conducting investigative field activities will be initiated at U.S. EPA Level D with a provision for upgrade to Level C, as necessary. Specific components for any level of protection will be selected based on hazardous assessment, with additional elements added, as necessary. Only PPE that meets the following American National Standards Institute (ANSI) standards are to be worn.

- Eye protection - ANSI Z87.1-1989
- Head protection - ANSI Z89.1-1986
- Foot protection - ANSI Z41-1991

Employees must maintain proficiency in the use and care of PPE that is to be worn. Typically this is covered during formal and informal refresher training sessions presented by AKT Peerless.

Only PPE that meets the following American National Standards Institute (ANSI) standards are to be worn.

Level D is the minimum acceptable level of protection for this project site. Upgrade to Modified Level D occurs when the possibility of contact to the skin or work uniform can occur from contaminated media. Upgrade to Level C will occur when results of air monitoring reveals action levels have been exceeded. Table 5, provides PPE selection health action levels.

**Table 5
PPE Health Action Levels**

Environmental Monitoring - The following environmental monitoring instruments will be used on the subject property.	
PID	
Air Monitoring: Air monitoring will be conducted during the sampling procedures to monitor exposure levels of volatile compounds. All personal air monitoring instruments will be calibrated and maintained per manufacturer's specifications. Test samples should be obtained for initial air monitoring to predict the type of PPE required.	
Personnel Monitoring: Personal exposure sampling will be implemented when deemed necessary by a Toxicologist, Industrial Hygienist, or other properly qualified individual.	
Heat/Cold Stress Monitoring: If temperatures exceed 80 °F, set up shaded rest area. If temperatures are below 32 °F, set up heated rest area. Baseline vitals will be taken if work is conducted in Level C or higher protection.	
PERSONAL PROTECTIVE EQUIPMENT	
<u>Health Action Levels</u>	<u>Required PPE Level</u>
PID Deflections 0-5 ppm in the breathing zone	Level D
PID Deflections of >5 ppm <10 ppm sustained for more than 5 minutes in the breathing zone	Level C
PID Deflections >10 ppm <50 ppm sustained for more than 15 minutes in the breathing zone	Level B required ⁽¹⁾
PID Deflections >50 ppm in the breathing zone	Shut down operations & contact AKT Peerless HSO
Test sample concentration for lead is <50 µg/m ³ for 8 hr. TWA and asbestos is <0.2 f/cc	Level D
Test sample concentration for lead in a >50 µg/m ³ for 8 hr. TWA and is >0.2 f/cc for asbestos	Level C

⁽¹⁾ Contact AKT Peerless HSM immediately.

U.S. EPA Level D Protection

- Tyvek7 coveralls*
- Steel toe boots
- Safety glasses with side shields or chemical splash goggles

- Gloves (surgical gloves: mandatory when handling potentially contaminated materials or contaminated tools)
- Disposable boot covers*
- Hard hat (mandatory during heavy equipment activities)
- Fluorescent vest, when vehicular traffic is on site or adjacent to site

Modified Level D Protection

One or more of the following:

- Chemical resistance (acid or solvent) boot covers
- PE-coated Tyvek® suit, NBR outer and nitrile inner gloves if skin contact with contaminants is possible.
- Hearing protection (muffs and/or plugs).

U.S. EPA Level C Protection

- Full-face piece APR with appropriate cartridges (NIOSH-approved)
- Chemical-resistant clothing (e.g., disposable chemical-resistant one-piece suit [Tyvek])
- Inner and outer chemical-resistant gloves and boots
- Chemical-resistant safety boots
- Two-way radio communications*
- Disposable boot covers*
- Hard hat (mandatory during heavy equipment activities)
- Face shield*
- Cooling vests or Thermal Protection
- NIOSH approved respirator with organic vapor / acid gas HEFA filters

* Optional, as applicable

4.4 OTHER PROTECTIVE EQUIPMENT

Hearing protection in the form of earplugs should be worn at all times by workers when within 25 feet of operating drilling or excavation equipment. On-site personnel working in areas where there is possible danger of head injury from impact or from falling or flying objects will be protected by hard hats meeting the requirements and specifications of American National Standards Institute (ANSI) Z89.1-1986. Safety footwear will meet the requirements of ANSI Z41 PT 91 M I/75 C/75.

4.5 RESPIRATOR SELECTION AND FIT TEST

All personnel who may wear respiratory protection will have current medical clearance for respirator use and a current fit test and quantitative fit testing will be performed on all personnel associated with the project. This information will be retained in the AKT Peerless office in Farmington, Michigan.

5.0 SITE MONITORING

Monitoring of the work environment will ensure that immediately dangerous to life or health (IDLH) or other dangerous conditions are identified. At a minimum, this monitoring will include evaluations for combustible atmospheres, oxygen deficient environments, and hazardous concentrations of airborne constituents, if deemed necessary by the SHSO.

Daily air monitoring information will be maintained in the SHSO's field logbook(s) and/or Daily Field Reports. These logs will contain the names of all personnel conducting work at the subject property, describe the work being performed at the subject property, and describe any new procedures established for performing work. In addition, these logs will list the types of air monitoring equipment being used, how and when this equipment was calibrated, air monitoring results, the level of PPE being used, and complete descriptions of all injuries, accidents, physical complaints, and unusual occurrences.

5.1 AIR MONITORING

If possible, the SHSO will evaluate the presence of airborne chemicals of concern through use of direct reading instrumentation (e.g., PID). Information gathered will be used to ensure the adequacy of the levels of protection being employed at each area requiring environmental evaluation, and may be used as a basis for upgrading or downgrading the levels of protection, at the discretion of the SHSO. Required levels of PPE are summarized in Table 3. Monitoring for combustible atmospheres and oxygen-deficient environments will be conducted during all field activities, including, but not limited to, soil boring, monitoring well installation, concrete coring, and equipment decontamination using the PID.

Air monitoring must be performed on all sites in accordance with AKT Peerless practices. Organic vapor and/or concentrations are monitored in the field with a FID or PID with a 10.2 eV or 11.7 eV lamp. Flammable vapor and/or gas are monitored with an oxygen/combustimeter (O₂/LEL) real-time instrument. Airborne dust/particulate concentrations are measured with a real-time aerosol monitor (using a scattered light photometric sensing cell) when there are visible signs of airborne dust. Specific real-time air monitors for O₃ / cyanide/ carbon monoxide are used during O₃ sparging / potential cyanide gas generation from intrusive activities/ combustion engine exhaust. Detector tube grab sampling is conducted for (list specific compounds), when results of non-specific real-time monitor action levels are reached or when their presence is suspected. Both area and personal air monitoring readings are to be taken to characterize site activities. Air monitoring results must be documented on the Air Monitoring Form (refer to Appendix E).

ATTENTION: SITE PERSONNEL ASSIGNED RESPONSIBILITY TO CONDUCT AIR MONITORING MUST HAVE BEEN TRAINED IN AIR MONITORING EQUIPMENT OPERATION AND CALIBRATION PRIOR TO ITS USE.

Calibration and maintenance of air monitoring equipment must follow manufacture specifications and documented. Recalibration and adjustment of air monitoring equipment must be completed when site conditions and equipment operation reveal the need. Record all air monitoring equipment calibration and adjustment information on form in Appendix E.

Air monitoring action levels (Table 7) have been developed by the AKT Peerless HSM, to indicate the chemical concentrations in the breathing zone that require an upgrade in level of PPE. Action levels are typically set at either one-half the OSHA Permissible Exposure Limit (PEL), NIOSH Recommended Exposure Limits (REL), or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV). Rationale for establishing action levels is based upon the data available that characterizes contaminants of concern in soil or water. Calculation for estimating action levels is then completed using the principles of Henry's Law (volatiles in water), fugacity (volatiles in soil), and proportionality (particulates in soil). When analytical data is not available, a qualitative assessment is conducted based on knowing the contaminants of concern and then setting action levels based on the compound(s) with the lowest OSHA PEL, NIOSH REL or ACGIH TLV, and following an air monitoring schedule that will minimize any potential for over exposure.

All workers on-site must have been properly fitted with PPE (i.e., respirators) and have been trained in their use (i.e., donning and doffing). Air monitoring measurements will be taken in the breathing zone of the worker most likely to have the highest exposure. Transient peaks will not automatically trigger action. Action will be taken when levels are consistently exceeded in a 5-minute period. Similarly, if chemical odors are detected that are a nuisance, bothersome, or irritating, an upgrade in respiratory protection can provide an extra level of comfort or protection when conducting site activities. Guidelines for frequency of air monitoring are presented in Table 6. Job tasks that require air monitoring, the applicable action levels that apply for those tasks, and the frequency of air monitoring are described in Table 6 and Table 7 respectively.

Engineering controls such as the venturi air mover (supplied by compressed air) to exhaust or dilute solvent vapors emanating from monitoring wells or when conducting intrusive activities can be utilized as a means to downgrade PPE requirements (Level B to C, Level C to D).

Table 6
Air Monitoring Frequency Guidelines

Conduct periodic monitoring when:

1. It is possible that an immediately dangerous to life or health (IDLH) condition or a flammable atmosphere has developed, or,
2. There is an indication that exposures may have risen over established action levels, permissible exposure limits or published exposure levels since the last monitoring. Look for a possible rise in exposures associated with these situations:
 - **Change in site area** - work begins on a different section of the site.
 - **Change in contaminants** - handling contaminants other than those first identified.
 - **Visible signs of particulate exposure from intrusive activities such as drilling/boring and excavation.**
 - **Perceptible chemical odors or symptoms of exposure.**
 - **Change in on-site activity** - one operation ends and another begins.
 - **Handling leaking drums or containers.**
 - **Working with obvious liquid contamination** (e.g., a spill or lagoon).

Conduct air monitoring when the possibility of volatilization exists.

Table 7
Air Monitoring Action Levels

Instrument*	Function	Measurement	Action
FID or PID (10.2/11.7 and/or eV lamp) - Measures Total Organic Vapors			
Conduct air monitoring for volatile organic compounds during activities where contaminated media are present.		0 – 2 ppm	Level D/Modified Level D required. Check for benzene with detector tubes.
		>2 - 50 ppm	Upgrade to Level C.
		>50 - 1,000 ppm	Upgrade to Level B. Coordinate with PM and HSR for guidance.
		>1,000 ppm	Stop work required. Leave work area, contact PM and HSR for guidance.
Benzene Detector Tubes			
Conduct grab sampling for benzene when sustained PID/FID readings are detected in the breathing zone.		0 - 0.5 ppm	Level D/Modified Level D required.
		>0.5 - 50 ppm	Upgrade to Level C required.
		>50 - 1,000 ppm	Upgrade to Level B required.
		>1,000 ppm	Stop work required. Contact PM and HSR for guidance.
Cyanide Real-Time Monitor			
Conduct air monitoring when intrusive activities such as drilling, boring or excavation could release cyanide gas.		0 - 2.5 mg/M ³	Level D/Modified Level D required
		>2.5 - 12 mg/M ³	Upgrade to Level B required.
		>12 mg/M ³	Stop work required. Leave work area, contact PM and HSR for guidance.
Dust/Particulate Monitor			
Conduct air monitoring for dust particulate when sustained (> 5 minute) levels of visible dust are generated and engineering controls such as wet methods are ineffective.		0 - 2.5 mg/M ³	Level D required.
		2.5 - 50 mg/M ³	Upgrade to Level C.
		>50 mg/M ³	Stop work. Contact PM and HSR for guidance.
Oxygen/Combustimeter (O ₂ /LEL) Measures oxygen level (O ₂) and lower explosive limit (LEL)			
Conduct air monitoring for O ₂ /LEL when conditions exist where flammable vapors/gases and/or oxygen deficiency or enrichment can occur. A decreased O ₂ reading of 0.1% (e.g., 20.9% to 20.8%) actually represents a change in the total air envelope of approximately 0.5% or 5,000 ppm. This represents little hazard if the displacing gas is inert; if the displacing gas is toxic/flammable/reactive, such a concentration represents a real hazard. Verify reasons for O ₂ depletion by conducting air monitoring with instruments that can measure suspected contaminants.		O ₂ = 20.9 %	Acceptable
		O ₂ >19.5 - 20.8%	Verify reasons for O ₂ depletion with appropriate air monitoring instrumentation before work continues. Utilize appropriate engineering controls/PPE once atmospheric contaminants have been verified.
		O ₂ >20.9 % - 22 %	Verify reasons for O ₂ enrichment before entering area. Utilize appropriate engineering controls/PPE to control O ₂ enriched atmosphere.
		O ₂ >22 %	Leave area immediately; this atmosphere is extremely flammable. Notify PM or HSR for guidance.

Instrument*	Function	Measurement	Action
(PID/FID) or that can confirm presence of contaminants (detector tubes or chemical specific real-time air monitors).		O ₂ <19.5%	Leave area immediately; this atmosphere is oxygen deficient. Verify reasons for O ₂ depletion with appropriate air monitoring instrumentation before work continues. Utilize appropriate engineering controls/PPE once atmospheric contaminants have been verified.
		LEL <10%	Acceptable conditions. Continue normal activity.
		LEL >10%	Leave area immediately. Contact PM or HSR for guidance on venting and other safety measures.
*Note: Instruments must be calibrated according to manufacturer's recommendations.			

Table 8
Air Monitoring Hazard Summary

Job Task	Level PPE	Instrument	Frequency
Drilling/Boring Soil Sampling	Modified Level D (See Section 4.3)	PID ¹ or FID ² , O ₂ /LEL ³ , DT ⁴ , DM ⁵	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.
Well Installation	Modified Level D (See Section 4.3)	PID or FID, O ₂ /LEL, DT, DM	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.
Monitoring Well Bailing/ Gauging/ Sampling	Modified Level D (See Section 4.3)	PID or FID, O ₂ /LEL, DT	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.
Soil Gas Survey	Modified Level D (See Section 4.3)	PID or FID, O ₂ /LEL, DT	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.
Aquifer Pump Test	Modified Level D (See Section 4.3)	PID or FID, O ₂ /LEL, DT	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.
Tank Removal	Modified Level D (See Section 4.3)	PID or FID, O ₂ /LEL, DT, DM	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.
Excavation/ Trenching	Modified Level D (See Section 4.3)	PID or FID, O ₂ /LEL, DT, DM	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.
Groundwater Sampling	Modified Level D (See Section 4.3)	PID or FID, O ₂ /LEL, DT	Start up of work, then 15 minutes to continuously based on sampling results and sample location. Continuously if action level is exceeded.

¹ PID, Photoionization Detector

² FID, Flame Ionization Detector

⁴ DT, Benzene Detector Tube

⁵ DM, Dust/ Particulate Monitor

³ O₂/LEL, Oxygen Level and Combustible Gas Meter

Note: "Start up of work at each new task location" means to monitor the air quality at each new operation on the site. The breathing zone is the area inside a 1-foot radius around the head.

6.0 DECONTAMINATION

6.1 PERSONNEL DECONTAMINATION

Table 9 provides instruction for decontaminating of personnel exiting the subject property in which U.S. EPA Level C or above PPE was used. For areas where lesser levels of PPE are appropriate, this table will be used as a guideline, but the process will be modified to Level D decontamination. Level D decontamination involves removing any disposable protective clothing and washing face and hands before eating or drinking.

Disposable items (e.g. Tyvek coveralls, inner gloves, and latex overboots) will be changed daily unless there is reason for changing sooner. Dual respirator cartridges will be changed daily unless more frequent changes are deemed appropriate by site surveillance data or personal assessment. Pressurized sprayers or other designated equipment will be available in the decontamination area for wash down and cleaning of personnel, samples, and equipment.

Respirators will be decontaminated after daily use. The masks taken from the drop area will be disassembled, the cartridges set aside, and other parts placed in a cleansing solution. After an appropriate time in the solution, the parts will be removed and rinsed off with tap water. The old cartridges will be discarded into the container for contaminated trash disposal. Each morning, masks will be reassembled and new cartridges installed. Personnel will thoroughly inspect their own respirators prior to each time the respirators are donned. Where atmosphere-supplying respirators are used, specific, trained personnel will be assigned to maintain and monitor the atmosphere supply system in strict accordance with the manufacturer's instructions and the protocols established for that specific area.

Table 9
Decontamination Process

Segregated Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) On plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.
Boot Cover and Glove Wash	2. Scrub outer boot covers and gloves with detergent and water.
Boot Cover and Glove Rinse	3. Rinse off decon water from boot covers or over boots and glove wash using copious amounts of water.
Tape Removal	4. Remove tape around boots and gloves and deposit in plastic liner.
Boot Cover Removal	5. Remove boot covers and deposit in plastic liner.
Outer Glove Removal	6. Remove outer gloves and deposit in plastic liner.
Tyvek Suit Removal	7. Remove Tyvek suit and deposit in plastic liner.

Face Piece Removal	8. If respirators are used, wipe down the respirator exterior with a wet paper towel, remove and deposit in container with plastic liner. Avoid touching face with fingers. Respirators will be washed in a sanitizing solution, rinsed with potable water and allowed to dry.
Inner Glove Removal	9. Remove inner glove and deposit in lined container. 10. Wash hands, face, and any other potentially contaminated areas with a potable water/mild soap solution followed by a potable water rinse. 11. Shower and launder personal clothing as soon as possible upon completing daily activities.

6.2 SMALL EQUIPMENT DECONTAMINATION

Small equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as much of the instruments as possible with plastic without hindering the operation of the unit. Contaminated equipment will be taken from the drop area and the protective coverings removed and disposed of in the appropriate containers. Sample equipment will be decontaminated by removing gross contamination in the Exclusion Zone and then taken to a central decontamination area. Decontamination of small equipment will be conducted in the method described in Table 5. Any dirt or obvious contamination will be brushed or wiped with disposable paper wipe. The units will then be taken indoors and placed in a clean tub, wiped off with damp disposable wipes and dried. The units will be checked, standardized and recharged as necessary for the next day's operation. The units will then be prepared with new protective coverings.

Table 10
Small Equipment Decontamination

<i>Soil Sampling Equipment -</i> Detergent and distilled water wash, distilled water rinse between each sample collection with fresh water. Dispose of protective gloves in trash bag.
<i>Sludge/Water Sampling Equipment -</i> Disposable equipment to be containerized and disposed of properly. Non-disposable equipment to be detergent and distilled water wash, distilled water rinse between each sample collection with fresh water. Protective gloves, disposable.

All equipment and solvents used for decontamination shall be decontaminated or disposed of properly. All site personnel should minimize contact with contaminants in order to minimize the need for extensive decontamination.

6.3 HEAVY EQUIPMENT DECONTAMINATION

It is anticipated that the down hole equipment of the drilling rigs and/or Geoprobe will be contaminated during borehole activities. Drilling rigs, Geoprobe, or other heavy equipment machinery will be cleaned at the work area or central staging area with high-pressure steam. Loose material will be removed by brush. The person performing this activity will be at least at the level of protection utilized during personal and monitoring equipment decontamination.

6.4 DISPOSAL OF DECONTAMINATION EQUIPMENT

Disposable PPE, bailers, and other disposable materials will be staged on-site for disposal. Once used, disposable materials (e.g., gloves and Tyvek) will be double-bagged and stored as is or placed in U.S. Department of Transportation (DOT) approved 55-gallon drums. Double bagged PPE will not be stored outdoors. Water used in the decontamination of equipment will not be collected or containerized, unless gross contamination is identified. Additionally, soils will not be collected or containerized, unless gross contamination is identified.

7.0 CONFINED SPACE ENTRY

In the event site work may require personnel to enter confined spaces. No AKT PEERLESS employee or subcontractor shall enter an area identified as a confined space without using the CSE procedures described in Appendix G and the site-specific entry procedures presented in Appendix L. The purpose of the CSE procedure is to protect employees from potentially hazardous environments and to facilitate immediate rescue in an emergency situation. A CSE Permit must be posted at the entrance to each confined space. An example of a permit required confined spaces identified for subsurface investigation projects include (insert type of CSE and location (e.g. recovery well vault).

8.0 EMERGENCY PLAN

This section identifies the emergency contingency plan undertaken for field activities at the subject property. Other sections of this HASP also provide information that would be used under emergency conditions. The Site-Specific HASP attachment provides emergency telephone numbers, route map to emergency medical facility(s), and emergency signals.

8.1 PERSONNEL ROLES, LINES OF AUTHORITY AND COMMUNICATION

The SHSO is the primary authority for directing operations during field activities under emergency conditions until other personnel (Local Emergency Personnel) can take control of the situation. All communications during emergency conditions will be directed through the SHSO or his/her designee.

8.2 EVACUATION

Withdrawal Upwind - Field personnel will continually note general wind directions while on-site. A simple windsock or flag may be set up near the work site for visual determinations. Upon noting the conditions warranting movement away from the work site, the crew will move upwind a distance of approximately 100 feet or farther, as indicated by air monitoring instruments. When access to an area is restricted and escape thus may be hindered, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes.

1. Immediately notify all on-site personnel of an emergency requiring evacuation.
2. Leave the dangerous area and report to a designated rally point.

3. Notify emergency medical service (EMS), as appropriate.
4. Account for all personnel.
5. Contact the PM and the HSR as soon as possible.
6. Maintain site security and control measures for community safety until emergency responders arrive.

8.3 EMERGENCY MEDICAL TREATMENT & FIRST-AID

Emergency first-aid supplies will be maintained at the site, including first aid kits and emergency eyewash kits. The locations of these supplies will be in the AKT Peerless support truck and/or site trailer.

Any person injured on-site will be rendered first-aid and/or CPR as appropriate and will be transported the nearest accessible medical facility to be evaluated by medical personnel for further examination and/or treatment. Under no circumstances will the injured person transport him/herself to a medical facility for emergency treatment. Directions to the nearest medical facility will be provided in the Site-Specific HASP attachment.

In the event that an injury occurs in the Exclusion Zone, provisions for decontamination of the victim(s) will be made. However, life-threatening conditions may preclude normal decontamination procedures. As such, arrangements will be made with the medical facility and transporter so that both are aware of the situation and can make appropriate provisions.

1. Survey the situation:

Do not enter an area that may jeopardize your safety.

- Establish the patient's level of consciousness.
- Call for help.
- Contact EMS and inform them of patient's condition.

2. Primary assessment (patient unconscious)

- Arousal
- Airway
- Breathing
- Circulation

Only trained personnel should perform CPR or First Aid - State you are medically trained.

3. Secondary assessment (patient conscious)

- Check for bleeding: Control with direct pressure.
- Do not move patient (unless location is not secure).

- Monitor vital signs.
- Provide First Aid to the level of your training.
- Contact the PM and HSR as soon as possible.
- Document the incident on AKT PEERLESS' PIR form.

Note: All incidents will be reported to AKT Peerless. After an injury is reported to AKT Peerless, a MIOSHA Form 300A, Summary of Work-Related Injuries and Illness will be documented. Any injury, illness, or exposure to contaminants above the IDLH will be documented and archived for the duration of the employee's term with AKT Peerless plus 30 years. Furthermore, any exposure of AKT Peerless personnel to blood borne pathogens, including any exposure that may occur in the rendering of first-aid and/or CPR, will be immediately reported to the SHSO and Project Director.

8.4 ACCIDENT/INCIDENT REPORTING

OSHA requires the reporting of work-related incidents resulting in the death(s) of any employee(s) or the hospitalization of three or more employees. The standard also requires the employer to verbally report such incidents to the U.S. Department of Labor within 8 hours after the employer learns of the incident by either written or verbal communication.

If an accident/incident occurs at the subject property, AKT Peerless will follow all required OSHA/MIOSHA reporting requirements.

9.0 OTHER HAZARD CONTROL MEASURES

9.1 ILLUMINATION

Site operations will not be permitted without adequate lighting. Therefore, unless provisions are made for artificial light meeting the 5-foot candle requirement of 29 CFR 1910.120, Exclusion Zone operations must halt in time to permit personnel and equipment to exit the Exclusion Zone and proceed through decontamination during adequate daylight. Conversely, operations will not be permitted to begin until adequate lighting is present.

9.2 LABORATORY HANDLING OF SAMPLES

A potential hazard exists to personnel at the laboratory, who analyze the samples collected during the subject property investigation. The laboratory will be notified regarding the nature of the possible hazardous substances involved.

9.3 UTILITIES

Subsurface activities will NOT take place at the subject property without a utility clearance from MISS-DIG. Please allow 72 business hours for MISS DIG to perform staking operations.

9.4 DRILL RIG OPERATIONS

Above and below ground utility lines may pose a safety hazard to workers during excavation or drilling. The operator will maintain a safe distance between overhead utility lines and the drill mast at all times. The location of underground utilities will be determined before excavation or drilling begins. No drilling will take place before MISS DIG has identified all utilities.

9.5 LOCKOUT / TAGOUT

AKT Peerless has developed a Lock Out/Tag Out Program for its use by employees and contractors under the direction of AKT Peerless staff. The purpose of these procedures is to safeguard employees while performing servicing or maintenance tasks or performing sampling activities near mechanical, electrical, or hydraulic equipment by the removal of energy sources (electrical, hydraulic, pneumatic, chemical, thermal and kinetic) that may cause serious injury to employees or property damage by accidental start-up of machinery, equipment or processes.

Lock Out/Tag Out tags should be available for use as part of AKT Peerless project field staff equipment kits. In the event that these are not available, a suitable lock out/tag out tag can be prepared using wire, plastic ties affixed to a written notice/tag

General Lock and Tag Out Procedures

1. Before working on, repairing, adjusting or replacing machinery and equipment, the following procedures will be utilized to place the machinery and equipment in a neutral or zero mechanical state.
2. Notify all affected employees that the machinery, equipment or process will be out of service.
3. If the machinery, equipment or process is in operation, follow normal stopping procedures (i.e. depress stop button, open toggle switch, etc.).
4. Move switch or panel arms to "Off or "Open" positions and close all valves or other energy isolating devices so that the energy source(s) is disconnected or isolated from the machinery or equipment. Stored energy (capacitors, springs, elevated members, rotating fly wheels, and hydraulic/air/gas/steam systems) must be relieved or restrained by grounding, repositioning, blocking and/or bleeding.
5. Lock out and tag out all energy devices by use of hasps, chains and valve covers with an assigned individual lock.
6. After assuring that no employee will be placed in danger, test all lock out and tag out processes by following the normal start up procedures. **Caution: After test, place controls back in 'neutral' position.**
7. Machinery or equipment is now locked out and tagged out.

In addition, Lock Out/Tag Out procedures involving electrical plug-type equipment includes the following to prevent accidental or sudden start-up:

1. Un-plug Electrical Equipment from wall socket or in-line socket.
2. Attach "Do Not Operate" Tag on end of power cord.

3. Test Equipment to assure power source has been removed by depressing the "Start" or "On" Switch.
4. Perform required operations.
5. Replace all guards removed.
6. Inspect power cord and socket before removing Tag. Any defects must be repaired before placing the equipment back in service.
7. Remove Tag and place equipment back in service.

NOTE: Occasionally used equipment should be unplugged from power source when not in use.

General Guidelines for Restoring Machinery and Equipment to Service:

When the task is complete and the machinery, equipment, or process are ready for testing or returned to normal service:

- Check the area to assure that no employee is exposed to a hazard.
- Account for all tools, repair or replace any defects and replace all safety guards.
- Remove lock and tag. Restore energy sources. Test to assure task has been completed satisfactorily.

Procedures Involving More Than One Staff Member:

In the preceding steps, if more than one technician is assigned to a task requiring a lock out and tag out, each must also place his or her own lock and tag on the energy isolating device(s).

Removal of Lock Out/Tag Out:

Only the staff member that locks out and tags out machinery, equipment or processes may remove his/her lock and tag. However, should the employee leave the site before removing his/her lock and tag, the Project Manager may remove the tag or give approval to third parties to remove the tag. However, it must be determined that all tools have been removed, all guards have been replaced and all employees are free from any hazard before the lock and tag are removed and the machinery, equipment or process are returned to service.

A field form that can be used for Lock Out/Tag Out procedures is provided for use and review in Appendix C.

9.6 BIOLOGICAL HAZARDS

The following biological hazards may be encountered: insects, snakes, rodents and poisonous plants (e.g., poison ivy). Field personnel will check with the SHSO to ensure that the use of insect repellent will not interfere with sample collection procedures.

To minimize the threat of bites and insect hazards, all personnel walking through brush will be aware of the potential for encountering insects and snakes and will avoid actions that may increase the possibility of encounters (e.g., turning over sticks, branches, and rocks). Additional

caution will be exercised around rock piles, which are known to support snakes. If a bite occurs, the hospital will be notified that a snakebite victim is inbound. The victim will be transported to the nearest hospital within 30 minutes.

9.6.1 Poisonous Vegetation

All personnel will be familiar with and be able to recognize poison ivy, poison oak, and poison sumac in the field. A reaction to poison ivy can be prevented if the exposed skin is washed with mild soap and water within 10 minutes of contact. Contact can be prevented by site workers wearing appropriate clothing. Site workers will remove contaminated clothing and wash their hands and faces before entering the break area.

9.6.2 Biting or Stinging Insects

Nests and hives for ants, bees, wasps, hornets and yellow jackets often occur in ground, trees and brush. The area will be checked for obvious nests and hives before it is cleared. If a nest or hive is found, an alternate sampling location will be selected. Bites and stings can be painful and may elicit an allergic reaction. Medical surveillance should identify any individuals with life-threatening allergies. These individuals will not work in areas where there is a great potential for insect stings. If simple first-aid measures do not alleviate the symptoms, the victim will be taken to the nearest medical center.

9.6.3 Potentially Infectious Wastes

During fieldwork activities, animal and/or avian wastes may be observed on the project site. Often these wastes are encountered within buildings and may accumulate in areas where breeding and nests have been created. The existences of these wastes represent a breeding ground for various potentially infectious diseases including (but limited to): Histoplasmosis. Based on this concern, it is recommended that AKT Peerless personnel remain knowledgeable of the potential hazards associated with wastes especially on sites where significant accumulations (i.e., several inches in thickness) are observed. In the event that these conditions are observed, contact with the project manager and the company Health and Safety Officer should be performed. Personnel protective equipment (PPE) to be worn should consist of modified Level D equipment including disposable rubber gloves and a full-face respirator equipped with organic vapor and HEPA cartridges. In the event that removal of these wastes are considered or deemed necessary, the PPE Level should be upgraded to Level C protection.

In addition to infectious wastes associated with animal wastes, potentially infectious medical wastes could be encountered at project sites that may involve work at health care facilities or on sites where illegal narcotic use has been observed (e.g., vacant buildings with previous vagrant occupancy, etc.). If these wastes are observed, it is advised that no contact with these wastes be performed. In the event that these conditions are observed, contact with the project manager and the company Health and Safety Officer should be performed.

9.7 HEAT STRESS

Information concerning the effects of heat stress on employees is described in the following sections. Additional documentation concerning heat stress and monitoring forms is included in Appendix I.

9.7.1 Effects of Heat Stress

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, movement) to death. Standard reference books should be consulted for specific treatment.

9.7.2 Heat-Related Problems

9.7.2.1 Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by chafing clothes. It decreases the ability to tolerate heat as well as being a nuisance.

9.7.2.2 Heat Cramps

Heat cramps usually affect people who work in hot environments and perspire a great deal. Loss of salt from the body causes very painful cramps of the leg and abdominal muscles. Heat cramps also result from drinking iced water or other drinks either too quickly or in too large a quantity. The symptoms of heat cramps are as follows:

- Muscle cramps in legs and abdomen
- Pain accompanying cramps
- Faintness
- Profuse perspiration

To provide emergency care for heat cramps, move the patient to a cool place. Give him/her sips of water. Apply manual pressure to the cramped muscle. Monitor the patients' pulse, respirations, temperature, and blood pressure. Remove the patient to a hospital if there is any indication of a more serious problem.

9.7.2.3 Heat Exhaustion

Heat exhaustion occurs in individuals working in hot environments; this disorder may be associated with heat cramps. The heat is transported from the interior of the body to the surface by the blood. The skin vessels become dilated, and a large amount of blood is pooled in the skin. This condition, plus the blood pooled in the lower extremities when in an upright position, may lead to an inadequate return of blood to the heart and eventually to physical collapse. The symptoms of heat exhaustion are as follows:

- Weak pulse

- Rapid and usually shallow breathing
- Generalized weakness
- Pale, clammy skin
- Profuse perspiration
- Dizziness
- Unconsciousness
- Appearance of having fainted (the patient responds to the same treatment administered in cases of fainting)

To provide emergency care of heat exhaustion, remove the patient to a cool place and remove as much clothing as possible. Monitor the patients' pulse, respirations, temperature, and blood pressure. **Do not administer water.** If possible, fan the patient continually to remove heat by convection, but do not allow chilling or overcooling. Treat the patient for shock and remove him to a medical facility.

9.7.2.4 Heat Stroke

Heat stroke is profound disturbance of the heat-regulating mechanism, associated with high fever and collapse. Sometimes this condition results in convulsions, unconsciousness and even death. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age (over 40) factor directly on the tendency to heat stroke. It is a threat to life and carries a 20 percent mortality rate. Alcoholics are extremely susceptible. The symptoms of heat stroke are as follows:

- Sudden onset
- Dry, hot and flushed skin
- Dilated pupils
- Early loss of consciousness
- Full and fast pulse
- Breathing deep at first, later shallow and even almost absent
- Muscle twitching, growing into convulsions
- Body temperature reaching 105 to 106 degrees or higher

When providing emergency care for heat stroke, remember that this is a true emergency. Transportation to a medical facility should not be delayed. Remove the patient to a cool environment if possible and remove as much clothing as possible. Assure an open airway. Reduce body temperature promptly by dousing the body with water or preferably by wrapping in a wet sheet. If cold packs are available, place them under the arms, around the neck, around the genitals, at the ankles, or any place where blood vessels that lie close to the skin can be cooled.

Monitor the patients' pulse, respirations, temperature, and blood pressure. Protect the patient from injury during convulsions.

9.7.3 Heat Stress Monitoring

All supervisors should ensure that their personnel are briefed on the hazards, symptoms, and treatment of heat related problems.

For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70°F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 85°F, workers should be monitored for heat stress after every work period.

1. Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the heart rate is higher, the next work period should be shortened by ten minutes (or 33 percent), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent.
2. Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99°F. If it does, the next work period should be shortened by ten minutes (or 33 percent), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.7°F at the beginning of the next period, the following work cycle should be further shortened by 33 percent. Oral temperature should be measured again at the end of the rest period to make sure that it has dropped below 99°F.
3. Respirations should be measured by counting the rise and fall of the chest wall. Respirations should be measured prior to start of work activities and should be counted for 30 seconds. Further, respirations will be counted at the beginning of each break and should not exceed 20 respirations per minute. If the respirations are higher, the next work period should be shortened by ten minutes (or 33 percent), while the length of the rest period stays the same.
4. Blood pressure should be measured prior to the start of work to obtain a baseline statistic. Further, blood pressures will be taken at each break and compared with baseline. If the systolic or diastolic values have changed more than ten, then the next work period should be shortened by ten minutes (or 33 percent), while the length of the rest period stays the same.
5. Good hygienic standards must be maintained by frequent change of clothing and daily showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

9.7.4 Personal Monitoring

9.7.4.1 Heat Stress

The Site Safety Officer or Site Supervisor will administer the following heat stress monitoring schedule required for those individuals performing continuous work under the conditions listed below. The individual performing the monitoring will be familiar with the symptoms and first aid procedures for heat stress listed in this Attachment employees will be encourage to monitor sign of heat stress among fellow employees via the “buddy system” when working in higher levels of protection. The Site Safety Officer, Site Supervisor or On-Site Coordinator should be contacted immediately upon the notice of any signs of heat stress in fellow employees. Fluids will be made available to all workers during work breaks. **Individuals working in Level A, B, or C will be monitored for heat stress prior to commencing work, during every work break, and immediately upon personal protective equipment removal.**

9.7.4.2 Monitoring Frequency

<u>Temperature (degree F)</u>	<u>Level D (at the SHSO discretion)</u>	<u>Level C, B, or A</u>
>90	Every 45 minutes	Every 20 minutes
85-90	Every 60 minutes	Every 30 minutes
80-85	Every 90 minutes	Every 60 minutes
75-80	Every 120 minutes	Every 90 minutes

9.7.5 Sign and Symptoms of Heat Stress

Heat Cramps: Caused by heavy sweating without electrolyte replacement. Signs and symptoms include: muscle spasms, pain in the hands, feet and abdomen.

Heat Exhaustion: Caused by increased cardiovascular stress or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating, dizziness, nausea, vomiting.

Heat Stroke: Failure of temperature regulation in the body; most serious form of heat stress; competent medical help required. Signs and symptoms include: red, hot, dry skin; reduced perspiration; nausea, dizziness or confusion; strong, rapid pulse; coma.

9.8 HYPOTHERMIA AND FROSTBITE

Information concerning the effects of hypothermia and frostbite on employees is described in the following sections. Additional documentation concerning heat stress and monitoring forms in included in Appendix I.

9.8.1 Symptoms of Hypothermia & Frostbite

When exposed to cold temperature and/or cold water, the body reacts instinctively in a pattern designed to preserve itself. It results to involuntary reactions originating in the brain. When the brain recognizes any dangerous temperature drop in the body core, it signals the body to make adjustments to compensate for the imbalance. First, in an attempt to preserve normal temperatures in the vital internal organs, the blood vessels in the extremities constrict (vasoconstriction). This slows the blood flow to the arms and legs, preserving that energy and warm blood for the body core. If there is continued heat loss and if the body core temperature drops below 95°F (35°C), the body then tries to generate more heat through shivering, which causes metabolic heat production to increase to several times the normal rate. This is the first real sign of hypothermia. Further heat loss, accompanied by a body core temperature drop to 90°F (32.2°C) or below, results in speech difficulty, loss of manual dexterity, slow reactions, mental confusion, and muscle rigidity (muscle hypertonus). If exposure continues further until the body's resources are exhausted and if the cold blood reaches the heart and the brain, heart failure and coma will result and lead inevitably to death. Death occurs when the body core temperature falls below 78°F (25.6°C).

If exposure occurs in temperatures that are below freezing (30°F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Injury due to frostbite may range from superficial redness of the skin, slight numbness and blisters, to the obstruction of blood flow (ischemia), blood clots (thrombosis), or skin discoloration due to insufficient oxygen in the blood (cyanosis). Frostbite may occur if the skin comes into contact with objects whose surface temperature is below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold, combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death and ulceration. Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet), and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration). These effects may last up to three years.

9.8.2 Treatment

If hypothermia occurs, certain first aid procedures can mean the difference between life and death for the victim. These include the following (as a general rule, treat all injuries in the order of their importance to preserving life):

9.8.2.1 Hypothermia

- Give artificial respiration and stop any bleeding, if necessary.
- Bring the victim into a warm room or shelter as quickly as possible.

- If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets or some other insulation between him and the ground.
- Remove all wet clothing.
- Provide an external heat source, for the body cannot generate its own heat. Wrap the victim in pre-warmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water, or use body-to-body contact to re-warm the body core. These measures will slowly reopen the peripheral circulation so as to minimize the possibility of aftershock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest or death.
- Do not allow the victim to sleep.
- Give warm, sweet drinks—no alcohol or pain relievers.
- Keep the victim still. Do not let him try to walk.
- Do not rub numb skin.
- Get medical help as soon as possible.

9.8.2.2 Frostbite

- Wrap the victim in woolen cloth and keep dry until he or she can be brought inside.
- Do not rub, chafe or manipulate frozen parts.
- Bring the victim indoors.
- Place the victim in warm water (102° to 105°F) and make sure it remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected parts if the victim has to go back out into the cold. The affected area may be refrozen.
- Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.
- Do not allow the victim to walk if his or her feet are affected.
- Have the victim gently exercise the affected parts once they are thawed.
- Seek medical aid for thawing of serious frostbite because the pain will be intense and tissue damage will be extensive.

9.9 BONDING AND GROUNDING

All person(s) involved in the operations of mixing, pouring or pumping of all flammable liquids between conductive containers shall use proper bonding and grounding practices. It shall be the responsibility of the waste removal contractor to ensure that proper bonding and grounding practices are followed and maintained. AKT Peerless personnel may be responsible for the following:

1. Surveying areas within the subject property for bonding and grounding needs; and

2. Ensuring all contractors within the subject property are following proper bonding and grounding practices during waste removal activities of flammable liquids.

All bonding and grounding shall be installed in accordance with Chapter 77 "*Static Electricity*" of the National Fire Protection Association.

APPENDIX A

AGREEMENT AND ACKNOWLEDGEMENT FORM

HASP AMENDMENT SHEET

VISITOR GUIDELINES

AGREEMENT AND ACKNOWLEDGEMENT FORM

AKT Peerless personnel have the authority to stop field activities at this site if any activity is not performed in accordance with the requirements of the HASP. All AKT Peerless project personnel, subcontractor personnel, and visitors are required to sign the Agreement and Acknowledgement Sheet **prior** to conducting field activities at this site.

[illegible]

HASP AMENDMENT SHEET

Project Name: _____

Project Number: _____

PM: _____

Location: _____

Changes in field activities or hazards:_____

Approved by: _____

Health and Safety Manager:_____Date:_____

VISITOR GUIDELINES

AKT Peerless is committed to providing a safe environment on all work sites for visitors, trainees, employees, and/or passersby. In order to accomplish this, the following guidelines must be followed.

Infractions of the listed requirements agreement will be viewed as extremely serious and will be subject to discipline up to and including termination for either the trainee and/or supervisor.

Any person not actively participating in the work at the rail yard is regarded as a "visitor" and must follow AKT Peerless' visitor guidelines while on the property.

- Visitors must sign in on the visitors log (next page).
- Visitors will be given a general hazard communication orientation as outlined below.

General Hazard Communication Orientation

- The following minimum PPE is required at all times while on the property:
 - Closed toed shoes
 - Hard hat
 - Safety glasses with side shields
 - As required by SHSO (i.e., gloves, hearing protection, Tyvek suit, etc.)
- Visitor must be under escort by an AKT Peerless representative at all times.
- Smoking is prohibited except in approved smoking areas.
- Be aware of slip/trip/fall hazards from uneven terrain and debris. Be alert at all times and observe slip/trip/fall hazards.
- Eating, drinking, and chewing tobacco is prohibited on the project except in approved trailer or kitchen areas.
- The rail yard has several areas that are contaminated with PCBs. The risk of exposure is via skin contact. Visitors will be informed of the location of these areas and will not be permitted access unless certain medical and training requirements are met and the Health and Safety Officer, or designee, grants approval.
- Visitors must understand the following emergency procedures for the site.

APPENDIX B

PIR INCIDENT REPORTING GUIDE

Check incident type:

- ☐ **Class I**
- ☐ **Class II**
- ☐ **Class III**

PRELIMINARY INCIDENT REPORT

Person Completing Report: _____ Office: _____ Date: _____ Incident Date: _____

Incident Time: _____ Location: _____

Person Involved in Incident: _____ Telephone: _____

Driver Name (if motor vehicle accident): _____ Telephone: _____

Type of Incident:

- | | | |
|--|--|--|
| <input type="checkbox"/> Personal Injury/Illness | <input type="checkbox"/> Near Miss Event | <input type="checkbox"/> Other |
| <input type="checkbox"/> Chemical Exposure | <input type="checkbox"/> Unsafe Condition/Action | <input type="checkbox"/> Fire/Explosion |
| <input type="checkbox"/> Equipment Damage | <input type="checkbox"/> Motor Vehicle Accident | <input type="checkbox"/> Theft |
| <input type="checkbox"/> Spill/Release | <input type="checkbox"/> Property Damage | <input type="checkbox"/> Customer Incident |
| <input type="checkbox"/> Permit/Code Compliance | <input type="checkbox"/> Newspaper/Radio/TV | |

Assoc. Leasing Vehicle #: _____ VIN # _____

Circle one based on initial findings: Preventable/Non-preventable

Personal Injury: ☐ Yes ☐ No (If no, go to next section) (If AKT Peerless Employee complete First Report)

☐ First Aid Only

☐ Hospitalization

☐ Medical Treatment

☐ Possible Injury, Not Confirmed

Person Injured:

☐ AKT Peerless Employee

☐ Subcontractor

☐ Customer/Public/Other

Nature of Injury, Illness or Exposure: _____

Describe nature of incident, how it occurred, who was involved, witnesses and possible causal factors: (Attach additional sheets if necessary)

☐ First Report of Injury Attached

☐ Police Report Attached

Describe immediate actions taken and persons notified: (Attach additional sheets if necessary)

Line Manager (Responsible for Follow-up):_____Office:_____

DISTRIBUTION

Provide this report to the project manager immediately. The project manager is responsible for the proper distribution of the PIR form per the Incident Reporting Guide. Notify the Health and Safety Department of all Class II and III incidents immediately by phone at (248) 302-3571. Mail and fax a copy of the PIR to (248) 615-1334.

INCIDENT REPORTING GUIDE

CLASS OF INCIDENT		
Class I: A minor incident that is dealt with at the local level.	Class II: A serious incident requiring immediate distribution and notification as described below and on the first page.	Class III: A highly significant incident requiring immediate notification and assistance from Company Health and Safety Officer.
<ul style="list-style-type: none"> First Aid injury Minor damage <\$200 Non-reportable quantity spill Near miss event Unsafe condition or action 	<ul style="list-style-type: none"> Personal injury (more than first aid to employee, subcontractor or public) Any motor vehicle accident Damage to or theft of property valued greater than \$200 but less than \$10,000 Near miss incident that could have been very serious Fire/Explosion Non-emergency notification of regulatory agency is required Served with subpoena or a citation by a regulating agency. (DO NOT ACCEPT. Have subpoena delivered to the Farmington, Michigan office; no written investigation report is required for a subpoena.) 	<ul style="list-style-type: none"> Possible Lost Work Day Injury Hospitalization (of one or more persons) Multiple injury of employees, subcontractors or public Unprotected chemical exposure Death Damage to or theft of property valued greater than \$10,000 Reportable quantity spill release Emergency notification of regulatory agency Regulatory agency response to incident site (inspection) Contact or appearance of news or public media
NOTIFICATION ACTIONS		
<ul style="list-style-type: none"> On-scene person notifies Project Manager immediately by phone. Provide PIR form to Project Manager and H&S Representative immediately following the incident. Project Manager investigates and follows up within 48 hours. 	<ul style="list-style-type: none"> On-scene person notifies Project Manager immediately by phone. Project Manager notifies the HSO with PIR form immediately following the incident. Project Manager provides a detailed final investigation report within 48 hours after the original PIR is submitted. The final report must be submitted to the HSO. 	<ul style="list-style-type: none"> On-scene person notifies Project Manager* immediately by phone. Project Manager immediately notifies Location Manager and HSO. PIR form is provided by fax immediately to (248) 615-1334. An incident management team conferences by phone and formulates an action plan.

*All Class II and III incidents must be communicated to the HSO.

APPENDIX C

LOCK OUT/TAG OUT PROCEDURES

This form is required to be completed when equipment (i.e. electrical, mechanical, pneumatic, chemical, thermal) that requires maintenance, which has stored energy, could be set in motion, thereby causing an injury. To complete the form:

- Identify all equipment (i.e. blower motor, recovery pump, etc);
- Describe the operation to be conducted (i.e. change fuse, change motor brushes, etc.)
- Describe the lockout method/location (i.e. circuit breaker panel outside remediation compound shed, using a single-pole, red plastic lockout clip)

SITE-SPECIFIC LOCK OUT/TAG OUT PROCEDURES		
EQUIPMENT	OPERATION	LOCKOUT METHOD/LOCATION

APPENDIX D

MSDS DEFINITIONS

MSDS

MSDS DEFINITIONS

(TLV-TWA)	<i>Threshold Limit Value - Time Weighted Average.</i> The time-weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed without adverse effect.
(PEL)	Time-weighted average concentrations similar to (and in many cases derived from) the Threshold Limit Values.
(REL)	<i>Recommended Exposure Limit</i> as defined by NIOSH similar to the Threshold Limit Values.
(IDLH)	<i>Immediately dangerous to life or health.</i> Any atmospheric condition that poses an immediate threat to life, or which is likely to result in acute or immediate severe health effects. Oxygen deficiency is IDLH .
(LEL)	<i>Lower Explosive Limit.</i> The minimum concentration of vapor in air below which propagation of a flame will not occur in the presence of an ignition source.
(UEL)	<i>Upper Explosive Limit.</i> The maximum concentration of vapor in air above which propagation of a flame will not occur in the presence of an ignition source.
Flash Point (FP)	The lowest temperature at which the vapor of a combustible liquid can be made to ignite momentarily in air.
Vapor Pressure (VP)	The pressure characteristic at any given temperature of a vapor in equilibrium with its liquid or solid form, often expressed in millimeters of mercury (mm Hg).
Odor Threshold	A property displayed by a particular compound. Low detection indicates a physiological sensation due to molecular contact with the olfactory nervous system (based on 50% of the population).
Ionization Potential (IP)	The amount of ionization characteristic a particular chemical compound displays.

MSDS

The following MSDS are for hazardous materials that will be encountered at this site. Contact your senior project manager if you need additional information on these materials.

APPENDIX E

AIR MONITORING FORM

DAILY INSTRUMENT CALIBRATION CHECK FORM

NOISE MONITORING FORM

AIR MONITORING FORM

Project Name: _____

Project Number: _____

Contaminants:_____

[illegible]

Project Name _____ Instrument: _____

Job Number: _____ ID #: _____

[illegible]

[illegible]

*Pre-calibrate noise monitor prior to conducting noise survey.

APPENDIX F

EXCAVATION/TRENCHING SAFETY PROCEDURES

TRENCH SAFETY DAILY FIELD REPORT

SOILS CLASSIFICATION CHECKLIST

EXCAVATION/TRENCHING - UNDERGROUND UTILITIES

UTILITY MARK-OUT RECORD SHEET

UNDERGROUND UTILITY CONTACT PREVENTION AND MANAGEMENT PLAN

EXCAVATION/TRENCHING - USTS

UST REMOVALS

ATTENTION:

**THE TRENCH SAFETY DAILY FIELD REPORT FORM MUST BE COMPLETED AT
LEAST DAILY DURING EXCAVATION/TRENCHING OPERATIONS AND MORE
FREQUENTLY IF CONDITIONS CHANGE.**

EXCAVATION/TRENCHING SAFETY PROCEDURES	
Evaluation: Conducted by Competent Person 29 CFR 1926.	
<ul style="list-style-type: none"> Two soil classifications must be completed to determine sloping/shoring requirements. Conduct daily inspections of all open excavations prior to entry. 	
Egress: Excavation areas 4 feet (1.22 meters) or more deep	
<ul style="list-style-type: none"> Ladders must be spaced no more than 25 feet (7.62 meters) apart so that a person in the trench is always within 25 feet (7.62 meters) of a ladder for egress. 	
Shoring: Excavation areas 5 feet (1.52 meters) or more deep	
<ul style="list-style-type: none"> Excavations must be sloped or shored if personnel will be entering the excavation. Soil classification may be done only by a competent person using both a visual and manual test. <p>WARNING: One soil classification may not be enough. Outside disturbances during excavation may change even the best classification. <i>Inspect the soil after any condition change.</i></p>	
Storage: All excavations	
<ul style="list-style-type: none"> Spoils and heavy equipment must be stored a minimum of 2 feet (0.61 meters) from the edge of the excavation. Store spoils on the downhill side. 	
Maximum Allowable Slopes	
Soil or Rock Type	Maximum allowable slopes (H:V) ¹ for excavations less than 20 feet (6.10 meters) deep ²
Stable Rock ³	Vertical (90°)
Type A highly cohesive soil	3/4:1 (53°)
Type B cohesive soil with some sand	1:1 (45°)
Type C loose, wet, or sandy soil	1½:1 (34°)
Notes: ¹ Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off. ² Sloping or benching for excavations greater than 20 feet (6.10 meters) deep shall be designed by a registered professional engineer. ³ A short-term maximum allowable slope of ½ H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 meters) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 meters) in depth shall be 3/4 H:1V (53°)	

TRENCH SAFETY DAILY FIELD REPORT

DATE: _____

Project Name: _____

Project Manager: _____

Weather Conditions: _____

I hereby attest that the following conditions existed and that the following items were checked or reviewed during this inspection.

INSPECTION ITEM	YES	NO	NA
All open trenches were inspected.			
Were any tension cracks observed along top of any slopes?			
Was any water seepage noted on trench walls or trench bottom?			
Was bracing system installed in accordance with design?			
Type shoring being used _____			
Is shoring secure?			
Was there evidence of shrinkage cracks in trench walls?			
Was there any evidence of caving since the last field inspection?			
Trench box(s) certified with tabulated data?			
Traffic in area adequately away from trenching operations with barricades			
Surface encumbrances and other hazards in area accounted for?			
Protective measures taken for standing water in trench.			
All site personnel wearing reflective vest.			
Atmospheric testing conducted in trenched < 4 feet deep.			
Vibrations from equipment or traffic too close to trenching operation?			

Observations: _____

Competent Person Signature: _____

SOILS ANALYSIS CHECKLIST

This checklist must be completed when soil analysis is conducted to determine the excavation soil type. A separate analysis must be performed on each layer of soil excavation walls. Additional soil analysis must also be performed for the excavation (trench) when it stretches over a distance where soil type may change.

Name: _____ Date: _____

Time: _____

Competent person: _____

Where was the sample taken from? _____

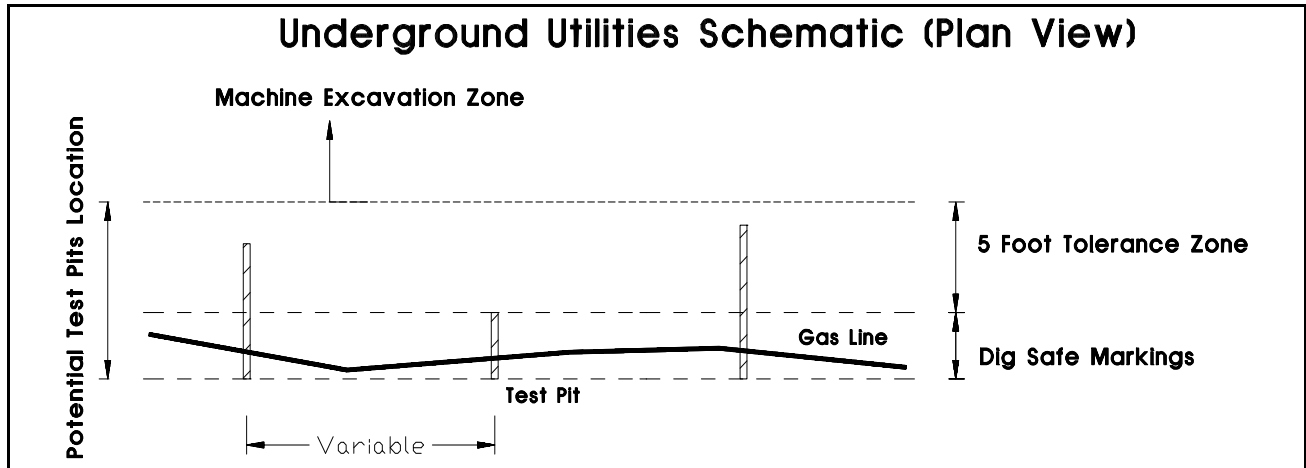
Excavation: Depth _____ Width _____ Length _____

SOIL CLASSIFICATION - VISUAL TEST				
ITEM	TEST PROTOCOL	YES	NO	COMMENTS/ACTIONS
1	Soil Particle Type <input type="checkbox"/> Fine Grained/Cohesive <input type="checkbox"/> Course Grained (Sand or Gravel)			
2	Excavation Water Conditions <input type="checkbox"/> Dry <input type="checkbox"/> Surface Water Present <input type="checkbox"/> Submerged Water Present			
3	Soil Condition <input type="checkbox"/> Undisturbed <input type="checkbox"/> Disturbed <input type="checkbox"/> Layered Soil Dipping into Excavation <input type="checkbox"/> Excavation Exposed to Vibrations <input type="checkbox"/> Cracked/Fissures/Spalling Observed			
4	Additional Excavation Hazards <input type="checkbox"/> Surface Encumbrances (If YES - What Type) <input type="checkbox"/> Hazardous Atmosphere in Excavation (If YES - List Source and Conditions)			

SOIL ANALYSIS - MANUAL TEST		
RESULTS	THUMB TEST	Check here if conducted
	Type A - Soil identified by thumb with great degree of effort	
	Type B - Soil identified by thumb with some degree of effort	
	Type C - Soil identified by thumb with little degree or no effort	
RESULTS	PENETROMETER OR SHEARVANE (Circle which used)	Write in brand/model
	Type A - Soil with unconfined compressive strength of 1.5 tons per square foot (tsf) or greater	
	Type B - Soil with unconfined compressive strength > 0.5 to 1.5 tsf	
	Type C - Soil with unconfined compressive strength < 0.5 tsf or soil that is submerged or exposed to water	
Soil Classification		
<input type="checkbox"/> Type A <input type="checkbox"/> Type B <input type="checkbox"/> Type C		
Selection of Protective System (Appendix F)		
PROTECTIVE SYSTEM	<input type="checkbox"/> Sloping Specify angle _____ <input type="checkbox"/> Timber shoring <input type="checkbox"/> Aluminum hydraulic shoring <input type="checkbox"/> Trench Shield. Max Depth in this soil _____	
Note: Although OSHA will accept the above tests in most cases, some states do not.		

EXCAVATION/TRENCHING - UNDERGROUND UTILITIES	
Documentation:	
<ul style="list-style-type: none">• Contact the local utility service (Digsafe, Misutility...), and document permit number• A company utility representative in questionable areas, elaborate trenching projects tight/tricky areas or whenever drilling adjacent to a building or structure• Contact the property owner and/or town building department for plans	
Physical Location:	
<ul style="list-style-type: none">• Use a metal detector to aid in the identification of obstructions• Observe utility markers, vent pipes, catch basins, newly paved areas, etc.	
Safety Procedures:	
<ul style="list-style-type: none">• Machine excavate five feet from any underground utility, tank, or utility marker• Hand dig in utility "<u>five-foot</u> tolerance zone" until the service is exposed• Utilize test pits to establish and QC markers for sensitive utility locations	
General Notes:	
<ul style="list-style-type: none">• Comply with local and state codes and regulations• Utilize experienced and trained equipment operators• Use appropriate subcontractors and applicable insurance riders• Hand dig per customer mandate	

UTILITY MARK-OUT RECORD SHEET



Facility: _____ Location: _____

AKT Peerless Representative: _____ Date Called: _____

County of Work: _____ Township of Work: _____

Contact Miss Dig to have subgrade utilities marked.

The nearest intersecting street for this site is: _____

We need the entire site area marked since we do not know exactly where we will be drilling/excavating.

The site needs to be marked by: _____

List which utilities they will have marked. Confirmation Number: _____

List other known utilities in the area that they do not mark: _____

Contact other known utilities not contracted by Miss Dig to have them mark the site.

MAJOR UTILITIES MARKED BY COLOR CODE

ELECTRIC - RED

GAS - YELLOW

COMMUNICATIONS/CABLE - ORANGE

WATER - BLUE

SEWER - GREEN

OTHER CONTACTS: _____

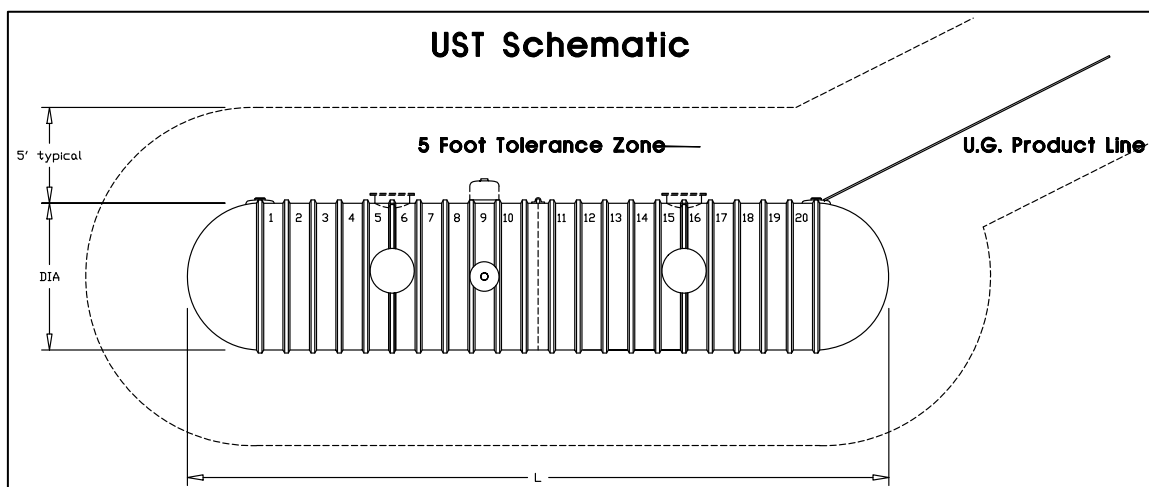
IMPORTANT NOTE: ALL UNDERGROUND UTILITIES MAY NOT BE LOCATED BY MISS DIG.

UNDERGROUND UTILITY CONTACT PREVENTION AND MANAGEMENT PLAN

Check Off When Completed

STEPS	TASK DESCRIPTION	RESPONSIBLE EMPLOYEE
STEP 1	<p>Obtain site blueprints from client, if available, to show buried utility/conduits.</p> <p>If site blueprints are unavailable other methods should be employed to identify subsurface conduits in the field. Examples include privately contracted utility locators such as SM&P, a hand-held utility location device, field observations (cut pavement, signs and overhead lights, water, electric, and gas meters, etc.), and customer personnel with knowledge of conduit locations. No one tool should be relied upon. Instead, as many tools as practicable should be employed to insure that all known/suspect conduits have been identified.</p> <p>Mark out any proposed digging locations with white survey paint.</p>	<p>PM</p> <p>PM and/or field personnel</p> <p>PM and/or field personnel</p>
STEP 2	<p>Contact underground utility locating service (before you dig). Give proposed drilling dates, location, etc. Documented notification of the proper underground notification service at a minimum of 48 or 72 hours prior to the scheduled site work.* (Check with the state for notification requirements).</p> <p>If possible, arrange site visit with client, facilities maintenance manager, or other site knowledgeable person to verify, utility and drilling/excavation locations.</p> <p>Regarding subcontractors: at a minimum, excavation subcontractors will be required to supply sufficient labor to complete all requested installation tasks.</p>	<p>PM and/or assistant for contacting “miss dig” and/or field personnel</p> <p>PM</p> <p>PM</p>
STEP 3	The HASP will be amended to include emergency telephone numbers for all utility companies identified during the notification process.	Office safety coordinator updates HASP with PM approval.
STEP 4	<p>On the day that on-site activities are scheduled to begin, at the first tailgate safety meeting, the locations of all known/suspect utilities (subgrade and overhead) will be reviewed with all personnel in the field (AKT PEERLESS and subcontractors).</p> <p>Make sure that all underground utility locator markings are visible for each noted utility, etc. Note any discrepancies. Visually inspect for undocumented trenches, laterals, etc. that may be visible as discolored areas, patched pavement, and not marked accordingly.</p>	<p>PM and/or field personnel</p> <p>PM and/or field personnel</p>
STEP 5	Pre-screen each drilling/digging location by hand augering and/or post hole digger to a depth of at least 3 to 5 feet using a 3-inch OD minimum clam-shell style post hole digger and/or hand auger. Inspect excavation periodically with	Subcontractors to conduct hand augering and/or post hole digging under AKT PEERLESS oversight.

STEPS	TASK DESCRIPTION	RESPONSIBLE EMPLOYEE
	flashlight to check for visual obstructions. Discontinue immediately upon encountering any substantial resistance to hand auger and/or post hole digger.	
STEP 6	During excavation or trenching activities, barricades and cones with flags will be used to mark the 10-foot distance from a located conduit. This will serve as a reminder of the conduit's presence and to alert the AKT PEERLESS supervisor that it is time to pay close attention to excavation/trenching activities.	Field personnel
STEP 7	<p>In the unlikely event that a subsurface utility/conduit is encountered, immediately halt all drilling/digging operations and secure the area. Try to determine the source (i.e., gas line, water line, etc.) and contact the emergency numbers for that utility. Contact the PM immediately. Take all safety precautions to insure that all flames, etc. are extinguished, and all personnel are kept away from the area. Monitor for LEL, O₂, PID, and any other substances that may be present as appropriate for that utility encounter (i.e., gas line).</p> <p>The PIR is filled out by field personnel and submitted to the PM.</p>	<p>AKT PEERLESS field personnel secures area and contacts the PM immediately.</p> <p>PM contacts client, etc., to discuss appropriate actions.</p> <p>AKT Peerless field personnel contacts local emergency officials as necessary (i.e., fire, police, EPA, public works, etc.).</p> <p>PM submits PIR to appropriate AKT Peerless management and prepares follow-up report.</p>



EXCAVATION/TRENCHING - UST	
Documentation:	
<ul style="list-style-type: none">• Refer to existing UST plans for potential location.• Contact property owners for potential location.• Contact local Fire or Building Department for information.	
Physical Location Characteristics: Cross-check to existing documentation, if available	
<ul style="list-style-type: none">• Determine tank capacity (from tank chart, owner, delivery records).• Determine tank opening locations and spacing.• Determine tank diameter (from tank chart, inventory records or gauge stick).• Determine if tank is fiberglass or steel; single walled or double walled• Refer to available UST vendor info charts on standard USTs for dimensions and tank opening locations.	
Safety Procedures:	
<ul style="list-style-type: none">• Empty tank of flammable liquids prior to excavation activities. Inert tank of flammable vapors and eliminate ignition sources (if practical).• Drill no closer than five feet from suspected tank location or other nearby underground utilities.	
General Notes:	
<ul style="list-style-type: none">• Concrete pad on top of the USTs is sized to overhang the footprint of the tanks by 1 to 2 feet in each direction. Beware of exceptions.• When possible, have the owner/client mark the locations for drilling and accept responsibility for potential mishaps in writing.• Redundant information. Crosschecking to reduce oversight errors.• Visual inspection of augered or excavated materials for pre-gravel, etc., indicative of UST backfill/bedding.	

UST REMOVALS		
Minimum Action	Site Set-Up	Precautions
<ol style="list-style-type: none"> 1. Ignition sources must be eliminated. 2. Designate a no smoking zone or area. 3. Use pneumatic/nonsparking tools when appropriate. 4. Define the work area with barricades and hazard tape. 5. Contact local underground utility locating service: Check location of all utilities including water and sewer. 6. Wear Level D PPE: Hardhat, safety glasses, steel-toe and shank boots, and traffic vest. Upgrade to modified Level D when possibility of contact to skin or work uniform can occur. Upgrade to Level C when air monitoring reveals action levels have been exceeded. This applies to all on-site personnel including subcontractors. 7. Perform air monitoring with an oxygen or combustimeter and an organic vapor analyzer at frequent intervals. 	<ol style="list-style-type: none"> 1. Ground vacuum truck. 2. Park vacuum truck downwind of excavation. 3. Vent vacuum truck vapors at least 12 feet from the ground surface; refer to the American Petroleum Institute (API) recommendations for greater clearance requirements. 4. Inert the tank with dry ice (1½ lbs. dry ice per 100 gallons tank capacity) or nitrogen. 5. Wear Level B PPE when cleaning tank interiors when indicated by HSR. 	<ol style="list-style-type: none"> 1. Verify tank inerting has been accomplished by measuring oxygen to be less than 8%. 2. Monitor LEL and organic vapors frequently in areas around tanks during removal process. <p>Note: LEL measurements taken in oxygen deficient atmospheres (e.g., in inerted tanks) will not be accurate.</p> <ol style="list-style-type: none"> 3. Check local/state requirements for tank removal/disposal regulations. 4. Assist subcontractor in performing tasks according to the HASP. 5. Notify the PM immediately when a sub-contractor will not follow site-specific safety protocols. The PM must inform the client.

APPENDIX G

CSE HAZARD ANALYSIS FORM

SITE-SPECIFIC CONFINED SPACES

CSE PERMIT

CONFINED SPACE PERSONNEL REQUIREMENTS

CSE HAZARD ANALYSIS FORM

Site Name: _____ Site Address: _____ CSE Name/Number: _____		
CSE Definition: <input type="checkbox"/> Vault <input type="checkbox"/> Tank/Vessel <input type="checkbox"/> Pit <input type="checkbox"/> Other: _____		
CSE Dimensions: Length = _____ Width = _____ Depth = _____	Sketch:	
Tasks/Activity/Reasons for Entry: <input type="checkbox"/> Well Gauging <input type="checkbox"/> Bailing Product <input type="checkbox"/> Pump Maintenance <input type="checkbox"/> Well Sampling <input type="checkbox"/> Product Recovery <input type="checkbox"/> Other _____	Potential hazards within space: <input type="checkbox"/> Oxygen Deficiency <input type="checkbox"/> Combustible Vapors <input type="checkbox"/> Toxic Vapors <input type="checkbox"/> Engulfment <input type="checkbox"/> No Hazards	Other CSE Hazards: <input type="checkbox"/> Greater than 5' deep <input type="checkbox"/> Difficult access/egress <input type="checkbox"/> Energy/isolation* <input type="checkbox"/> Prone to flooding <input type="checkbox"/> Slippery surface <input type="checkbox"/> Hot surfaces (i.e., pipes) <input type="checkbox"/> LOTO must be performed inside confined space.
FOR USE BY AUTHORIZED CSE SUPERVISOR		
CSE Classification Class I _____ Class II _____ Class III _____	Requirements:	
Completed by: _____ Date _____ Reviewed by: _____ Date _____		

SITE-SPECIFIC CONFINED SPACES

Site work may require personnel to enter confined spaces. **No AKT PEERLESS employee or subcontractor shall enter an area identified as a confined space without using the CSE procedures described in this appendix and completing the site specific entry procedures presented in the CSE Permit.** The purpose of the CSE procedure is to protect employees from potentially hazardous environments and to facilitate immediate rescue in an emergency situation. A CSE Permit must be posted at the entrance to each confined space.

CONFINED SPACES
Definition
A confined space has limited or restricted means of entry or exit, is large enough for an employee to enter and perform assigned work, and is not designed for continuous occupancy by the employee.
Examples
These spaces may include, but are not limited to, underground vaults, tanks, storage bins, pits and diked areas, vessels, and silos.
Characteristics
<p>A permit-required confined space is one that meets the definition of a confined space and has one or more of these characteristics:</p> <ul style="list-style-type: none"><input type="checkbox"/> Contains or has the potential to contain a hazardous atmosphere,<input type="checkbox"/> Contains a material that has the potential for engulfing an entrant,<input type="checkbox"/> Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section, and/or<input type="checkbox"/> Contains any other recognized serious safety or health hazards.
Protocol for CSE
<ul style="list-style-type: none"><input type="checkbox"/> Personnel trained to conduct CSE procedures.<input type="checkbox"/> Perform the appropriate air monitoring activity at various depths in the space prior to entry. Monitor for: (1) oxygen level, (2) flammable vapors, and (3) toxic vapors.<input type="checkbox"/> Ventilate the atmosphere in the space so that entry may be made safe without respiratory protection. If this is not feasible, appropriate respiratory protection must be worn by authorized entrants and attendants.<input type="checkbox"/> Wear appropriate respiratory protection when ventilation alone cannot achieve acceptable atmospheric levels of oxygen or flammable or toxic vapors.<input type="checkbox"/> Have appropriate retrieval equipment worn by employees in the event of a mishap.

[illegible]

CSE PERMIT

This permit must be completed prior to entering any confined space and is **ONLY VALID FOR THE DATE AND TIME INDICATED ON THIS FORM.** All procedural requirements contained in AKT PEERLESS Health and Safety Policy and Procedure No. 11 must be followed. In the event a confined space emergency situation develops and rescue is required, notify the following appropriate emergency services:

Ambulance: _____ Fire: _____ Police: _____

Purpose of entry: _____ Location of confined space: _____

Date: _____ Authorized duration: _____ Expires on: _____

Atmospheric Hazards: ☐ Oxygen Deficiency ☐ Flammable ☐ Toxic ☐ Other _____

Physical Hazards: ☐ Mechanical ☐ Electrical ☐ Chemical ☐ Engulfment ☐ Other _____

PRE-ENTRY REQUIREMENTS

Yes N/A

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Entry area is free of debris and object |
| <input type="checkbox"/> | <input type="checkbox"/> | Non-sparking tools used |
| <input type="checkbox"/> | <input type="checkbox"/> | Warning barriers and signs are in place |
| <input type="checkbox"/> | <input type="checkbox"/> | Atmospheric monitoring conducted |
| <input type="checkbox"/> | <input type="checkbox"/> | All hazardous lines have been isolated |
| <input type="checkbox"/> | <input type="checkbox"/> | Hot work permit attached |
| <input type="checkbox"/> | <input type="checkbox"/> | All energy sources have been LO/TO |
| <input type="checkbox"/> | <input type="checkbox"/> | Host employer and/or contractors notified |
| <input type="checkbox"/> | <input type="checkbox"/> | Forced air or exhaust ventilation is provided |
| <input type="checkbox"/> | <input type="checkbox"/> | Electrical equipment is properly grounded |

Yes N/A

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Low voltage (less than 25v) lighting used |
| <input type="checkbox"/> | <input type="checkbox"/> | Ground fault circuit interrupters (GFCI) provided |
| <input type="checkbox"/> | <input type="checkbox"/> | Electrical equipment rated for explosive atmospheres |
| <input type="checkbox"/> | <input type="checkbox"/> | No compressed gas cylinders in the confined space |
| <input type="checkbox"/> | <input type="checkbox"/> | The confined space has been drained and flushed |
| <input type="checkbox"/> | <input type="checkbox"/> | Entry and emergency procedures have been reviewed |
| <input type="checkbox"/> | <input type="checkbox"/> | All personnel have been trained (classroom/exercise) |
| <input type="checkbox"/> | <input type="checkbox"/> | All personnel have been informed of potential hazards |
| <input type="checkbox"/> | <input type="checkbox"/> | Attendant stationed at entrance and property inspected |
| <input type="checkbox"/> | <input type="checkbox"/> | Rescue equipment on location and readily accessible |

Yes	N/A		Yes	N/A		Yes	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	Hard Hat	<input type="checkbox"/>	<input type="checkbox"/>	Protective Clothing	<input type="checkbox"/>	<input type="checkbox"/>	Communications Equipment
<input type="checkbox"/>	<input type="checkbox"/>	Eye/Face Protection	<input type="checkbox"/>	<input type="checkbox"/>	Hearing protection	<input type="checkbox"/>	<input type="checkbox"/>	Ventilation to provide fresh air
<input type="checkbox"/>	<input type="checkbox"/>	Boots	<input type="checkbox"/>	<input type="checkbox"/>	Retrieval Device/Tripod	<input type="checkbox"/>	<input type="checkbox"/>	Respirator (type)_____
<input type="checkbox"/>	<input type="checkbox"/>	Gloves	<input type="checkbox"/>	<input type="checkbox"/>	Harness and Lifeline	<input type="checkbox"/>	<input type="checkbox"/>	Other_____

[illegible]

SUPERVISOR APPROVAL: I certify that all necessary precautions have been taken to make this confined space safe for entering and conducting the work during the prescribed time(s) as well as emergency response procedures.

Print Name:_____ Sign Name:_____ Date:_____

Entry Supervisor:_____ Permit Prepared by:_____

Atmosphere Tester:_____ Attendant:_____

ENTRANT ACKNOWLEDGMENT: I HAVE BEEN PROPERLY INSTRUCTED FOR SAFE ENTRY INTO THIS CONFINED SPACE AND UNDERSTAND MY DUTIES AND EMERGENCY PROCEDURES

Print Entrant Name	Sign Entrant Name	Employee or S.S. No	Date	Time
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

*An evaluation should be performed to consider all potential air contaminants that could be present and represent a hazard.

CONFINED SPACE PERSONNEL REQUIREMENTS

ENTRANT INSTRUCTIONS

All personnel who enter confined spaces must be thoroughly familiar with the following duties for entrants as listed below. Your primary responsibilities include:

- Understand the hazards of the confined space to be entered and the physical effects of those hazards.
- Continuously monitor the atmosphere inside of the confined space with a calibrated, direct reading, air-monitoring instrument.
- Evacuate the confined space:
 - If atmospheric hazards exceed the action level,
 - If a hazardous condition is identified inside of the confined space, and
 - Whenever attendant signals entrants to evacuate.
- Read and understand the rescue procedures.
- If PPE is required, the entrant must be properly trained on the use of the equipment prior to entry. PPE must be in good working condition.

ATTENDANT INSTRUCTIONS

You should be thoroughly familiar with the following duties when you assume the responsibility of attendant for a person or persons inside a confined space. Your primary responsibilities are the following:

- Focus on the safety of the personnel inside.
- Understand the hazards of the confined space to be entered and the physical effects of those hazards.
- Maintain the conditions and requirements listed on entry permit.
- Evacuate the space if you observe any condition that you consider hazardous.
- Read and understand the rescue procedures. Get help if an emergency situation develops. Never enter the confined space in an emergency unless you are trained and equipped with the proper equipment for confined space rescue operations (i.e., self contained breathing apparatus, safety harness, life line) and are relieved by another attendant.
- Keep an accurate count of all personnel inside of the confined space at all times.
- Do not leave the entrance to the confined space while any personnel are still inside unless you are properly relieved. These instructions must be passed onto your relief.
- If you have any questions regarding the job, check with your supervisor or a health and safety professional.

ENTRY SUPERVISOR'S INSTRUCTIONS

You should be thoroughly familiar with the following details to qualify as the Entry Supervisor for a permit-required CSE procedure:

- Requirements for confined space entrant and attendant instructions.
- Knowledge of the hazards that may be faced during entry, including information in the mode, signs and symptoms and consequences of exposure.
- Ability to verify that the appropriate entries have been made on the permit, and that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- Procedures to terminate the entry permit when the CSE operations have been complete or when a condition exists that is not allowed under entry permit requirements.
- Ability to verify that rescue services are available and that the means of summoning them are operable.
- Procedures to remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
- Ability to take responsibility for the confined space when entry is transferred to other personnel.
- Ability to determine that entry operations are still consistent with the terms of the CSE permit and that the prescribed intervals regardless of changes in entry personnel.

APPENDIX H

HOT WORK PERMIT

HOT WORK JSA

HOT WORK PERMIT

Project Name: _____ Job #: _____

Hot Work Task Description: _____

Workers/Welders Conducting Hot Work: _____

PERMIT MUST BE COMPLETED IN ITS ENTIRETY AND POSTED BEFORE HOT WORK BEGINS

Action Item	Yes	No	NA
Has client representative been notified of intended hot work?			
Hazardous materials involved? Name: _____			
Will hot work impact the general public, customers, or operations employees?			
Will the intended hot work need to be coordinated with other contractors who may be working on the site to make them aware of any hazards and the scope of work to be performed?			
Have hazardous energy sources been identified, isolated, and locked out - tagged out before the start of the project?			
Will hot work be conducted within a confined space?			
All testing equipment (i.e., CGI, oxygen meter, etc.) and fire fighting equipment (i.e., extinguisher, etc.) have been checked to ensure proper operation and calibration before the start of this project?			
Does task require a designated fire watch (30 minutes after work)?			
Flammable and combustible materials within 35 feet have been cleared or shielded.			
All fuel sources have been identified and protected (USTs, ASTs, sewers, piping).			
The area has been restricted with proper barriers and signs.			
The area has been tested to be certain that atmosphere is 0% LEL before starting hot work.			
Flame sensitive areas and equipment (including cylinders and gas delivery lines) exposed to slag, heat, and sparks are protected by flame a resistant blanket, shield, or removed from the area?			
Escape routes have been identified before starting work?			
Is ventilation equipment needed? Type needed: _____			

THE FOLLOWING PROTECTIVE EQUIPMENT WILL BE REQUIRED (PLEASE CHECK):

	Yes	No		Yes	No
Welding Goggles/Shield Tint	<input type="checkbox"/>	<input type="checkbox"/>	Hearing Protection	<input type="checkbox"/>	<input type="checkbox"/>
Safety Boots	<input type="checkbox"/>	<input type="checkbox"/>	Head Protection	<input type="checkbox"/>	<input type="checkbox"/>
Leather Gloves	<input type="checkbox"/>	<input type="checkbox"/>	Safety Harness	<input type="checkbox"/>	<input type="checkbox"/>
Supplied Air Respirator	<input type="checkbox"/>	<input type="checkbox"/>	Welding Leathers – Top	<input type="checkbox"/>	<input type="checkbox"/>
APR ____ Cartridge	<input type="checkbox"/>	<input type="checkbox"/>	Welding Leathers - Bottom	<input type="checkbox"/>	<input type="checkbox"/>

Cold Cut Only Method Required: _____ Hot Cut Method Allowed: _____

APPROVALS:

AKT PEERLESS Site Manager or Site Safety Officer: _____ Date: _____

Name of Employee Performing Hot Work: _____

Watch Representative: _____

Hot Work/JSA Welding/Torch Cutting	
Job Hazards	Safeguards/Precautions
1. Unsafe act Untrained worker	<ul style="list-style-type: none"> a. Require qualified operators only. b. Provide training per 29 CFR 1910.1200. c. Provide proper PPE. d. Inspect area prior to welding/cutting. e. Use permit system. f. Use fire watch for 30 minutes following termination of work.
2. Welder's flash to eye	<ul style="list-style-type: none"> a. Use filter lens based on actual hazard or welding technique in accordance with the American Welding Society Lens shade selector chart. b. Provide warning signals, barricades, or similar means to protect other workers, general public. c. Provide screens or barriers to protect other workers, general public.
3. Radiation burns, skin, burns, heat burns	<ul style="list-style-type: none"> a. Helmet with proper filter lens. b. Gauntlet gloves, leather apron. c. Cotton shirt, long sleeves, buttoned at sleeves and collar. d. Cotton cuffless pants. e. Steel toe boots, 6-inch minimum height. f. Hearing/ear cover protection as appropriate. g. Work zone definition - see 2(a) and (b) above.
4. Faulty equipment	<ul style="list-style-type: none"> a. Use equipment that is in good working condition. b. Inspect valves, regulators, and hoses prior to use. c. Preventive maintenance performed per manufacturer specifications.
5. Toxic fumes and gases	<ul style="list-style-type: none"> a. Provide source ventilation. b. Provide respiratory protection, selected based on hazard. c. Rope off area, define work area with cones, caution tape or similar (see 2(a) and (b) above).
6. Adjacent flammable/combustible materials	<ul style="list-style-type: none"> a. Move combustibles at least 50 feet from work area. b. If they cannot be moved consider protection by metal guards or flameproof curtain. c. Openings in walls, floors, or ducts should be covered if within 35 feet of work area. d. Assure facility sprinklers are in working condition and will not be taken out of service. e. Suitable fire extinguishing equipment shall be readily available at the work area. f. Designate a reliable means of contacting the Fire Department in the event of an emergency.

Hot Work/JSA Welding/Torch Cutting	
Job Hazards	Safeguards/Precautions
7. Flammable/combustible vapors	<ul style="list-style-type: none"> a. If in an environment classified as a hazardous location then define specific tasks using JSA technique. b. Provide equipment per classification (i.e., explosion proof, etc.) c. Post sign: DANGER - NO SMOKING, MATCHES OR OPEN LIGHTS. d. Ensure person is assigned as fire watch and fully charged extinguisher is present.
8. CSE	<ul style="list-style-type: none"> a. Follow CSE procedures. b. Use CSE permit. c. Define specific JSA techniques for that work. d. Exercise caution when using insertion to address O₂ deficiency. e. Exercise caution when using O₂/acetylene fuel mix, address O₂ enrichment from cylinder leak.
9. Unsecured compressed gas cylinders, cylinder handling	<ul style="list-style-type: none"> a. Store cylinders upright. b. Secure against stationary object. c. Cylinders in excess of 40 pounds in weight must be moved using wheeled cart or motorized truck. d. Lifting cylinders > 40 pounds in weight is prohibited. e. Compatible storage practices = separate O₂ cylinders from flammable combustible gases. f. Use tags on cylinders to mark full, in use or empty. g. Remove protective cap using hand method or use cylinder "cap wrench." Do not jam screwdriver or wrench in cap slots to loosen.
10. Unsafe practice during inactivity	<ul style="list-style-type: none"> a. Provide protective cap when cylinders are not in use. b. Valves or gas cylinders shall be closed and line pressure relieved. c. Power source of electric welding equipment shall be disconnected.
11. Improper flow of gases, gas mixing, pressure in gas lines	<ul style="list-style-type: none"> a. Label cylinders per 29 CFR 1910.1200. b. Color code hoses (green = O₂; red = fuel gases; black = inert gas or air hoses). c. Install "flash back" arresters for fuel mixing welding. d. Use acetylene at 15 pounds per square inch (psi) or less.
12. Improper ignition of oxygen/fuel torch	<ul style="list-style-type: none"> a. Use "spark lighter" to ignite. b. Don't use cigarette, match, or lighter for ignition.
13. Static electricity	<ul style="list-style-type: none"> a. Provide and use grounding clamp for electric area welding equipment.

APPENDIX I

HEAT/COLD STRESS PROCEDURES

HEAT/COLD STRESS PROCEDURES

1.0 HEAT STRESS

Heat stress is a significant potential hazard associated with the work task performed and the type and degree of protective equipment used in hot weather environments. Local weather conditions may produce conditions that will require restricted work schedules in order to protect employees. Monitoring for heat stress will follow one of two protocols depending on whether impermeable clothing (tyvek, saranex, rain gear, etc.) or permeable clothing (cotton coveralls) is worn. This section will apply to both hazardous and non-hazardous waste workers at the site. The SHSO with direction from HSR will determine the environmental wet bulb globe temperature (WBGT) and physiological (heart rate [HR] and oral temperature [OR]) monitoring to be conducted for both types of workers.

1.1 Workers Wearing Permeable Clothing

The ACGIH have set TLVs for worker exposure to heat stress in which it is believed that nearly all workers may be repeatedly exposed without adverse health effects. The TLVs assume that workers are acclimatized, fully clothed in permeable clothing with adequate water and salt intake, and capable of functioning effectively under the given working conditions without exceeding a deep body temperature (BT) of 100.4° Fahrenheit (F). Measurement of the WBGT has been found to be the most adequately measurable environmental factor in which to correlate with the deep BT and other physiological responses to heat. The following table reviews the work/rest regimen to be followed by all permeably clothed workers based upon routinely measured WBGT.

PERMISSIBLE HEAT EXPOSURE TLVS APPLICABLE TO WORKERS WEARING PERMEABLE CLOTHING

Work/Rest Regimen	Workload		
	Light	Moderate	Heavy
Continuous work	86 (76)	80 (70)	77 (67)
75% work - 25% rest, each hour	87 (77)	82 (72)	78 (68)
50% work - 50% rest, each hour	89 (79)	85 (75)	82 (72)
25% work - 75% rest, each hour	90 (80)	88 (78)	86 (76)
Values are given in °F WBGT.			
Rest means minimal physical activity. Rest should be accomplished in the shade. Any activity requiring only minimal activity can be performed during rest period.			
() Parentheses indicate the 10-degree adjustment for working in impermeable protective clothing.			

1.2 Workers Wearing Impermeable Clothing

Workers who must wear impermeable clothing are held at a higher risk of suffering heat stress. Impermeable clothing impedes sweat evaporation, one of the body's major cooling mechanisms. It is the duty of each employer to alert or notify the SHSO if symptoms of heat stress occur to their respective site personnel. Physiological and environmental monitoring of personnel wearing an impermeable protective equipment ensemble will commence when the ambient temperature rises above 70°F. Environmental monitoring will be conducted continuously for as long as the ambient temperature stays above 70°F and physiological monitoring will be conducted immediately before and after each work period. Frequency of physiological monitoring will increase as the ambient temperature increases or if slow recovery rates are indicated. The break time must be sufficient to allow workers to recover from the effects of heat stress. This will be accomplished by measuring the recovery HR and OT. The break time duration will be determined using the following methodology and criteria:

- ☐ Seat person being monitored,
- ☐ Take OT, and
- ☐ Measure pulse in the following sequence:
 - Pulse #1: 30 seconds to 1 minute after sitting
 - Pulse #2: 2½ to 3 minutes after sitting

An excessive heat stress condition exists when any of the following conditions exist:

1. Oral or ear temperature exceeds 99.5°F
2. If pulse #2 is greater than 90 beats/minute
3. Pulse #1 is greater than 100 beats/minute

Worker cannot return to work until:

- Oral or ear temperature is below 99.5°F
- Pulse rate is below 90 beats/minute
- Recovery HR for workers with HRs over 90 beats per minute is less than 10 beats per minute less than the original HR

Adhering to the guidelines for heat stress prevention and monitoring will greatly minimize the possibility of the occurrence of heat stress. Site personnel must also be aware of the symptoms of heat-related disorders and be prepared to administer the appropriate treatments.

1.2.1 Prevention

Provide plenty of fluids. A 50 percent solution of fruit juice or similar solution in water, or plain water will be available. For workers performing work inside an EZ, fluid intake may occur in the CRZ. Workers must first perform a partial decontamination process that will include removal of gloves and washing of hands and face prior to consumption of fluids. The SHSO will monitor the partial decontamination and fluid consumption process to ensure that ingestion of site contaminants does not occur.

Work in pairs whenever conducting Level B activity or permit required CSE activity.

Provide cooling devices. Ice vests or on-site showers can be provided to reduce BT and/or cool protective clothing.

The amount and type of undergarments worn will be left to the preference of each individual unless prone to heat stress, especially heat rash. In this case, the worker can wear "long john" cotton type underwear to keep skin off chemical resistant clothing.

Adjustment of the work schedule. When practicable, the most labor-intensive tasks should be carried out during the coolest part of the day.

Shaded or cooled rest areas. Shaded or cooled rest areas will be provided when site environmental and/or workers physiological responses warrant.

1.1.3 Heat Stress Monitoring

Physiological monitoring of personnel wearing an impermeable protective ensemble will be conducted at regular intervals at the beginning and conclusion of the work period. HR must be periodically measured for all site personnel when heat stress conditions (climate or wearing impermeable clothing). Additional physiological monitoring such as BT and body water temperature (BWT) monitoring can be measured for extreme temperatures and when impermeable clothing is worn.

- HR must be measured by the radial pulse for 30 seconds as early as possible in the resting period and repeated approximately 3 minutes into rest period.
- The HR at the beginning of the rest period should not exceed 110 beats per minute. The HR also should not exceed 90 beats per minute after approximately 3 minutes of rest. If the HR does exceed the criteria, the next work period will be shortened by 33 percent, while the length of the rest period will remain the same. If the HR still exceeds the criteria at the beginning of the next rest period, the following work period will be shortened by 33 percent.
- BT can be measured orally with a clinical or disposable thermometer, in accordance with manufacturer's instructions, as early as possible in the rest period (before drinking liquid). Oral or ear temperature at the beginning of the rest period should not exceed 99.5°F. If it does, the next work period will be shortened by 33 percent while the length of the rest period will remain the same. However, if the OT exceeds 99.5°F at the beginning of the next rest period, the following work period will be shortened by another 33 percent. A worker will

not be permitted to wear a semi-permeable or impermeable protective ensemble when his/her BT exceeds 99.5°F.

- Body water loss (BWL) due to perspiration can be measured by having the worker weigh him/her self at the beginning and end of each workday. Similar clothing should be worn at both weighing. BWL should not exceed 1.5 percent total body weight in a workday.

SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATED WORKERS¹

Adjusted Temperature ²	Normal Work Ensemble ³	Impermeable Ensemble ⁴
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

¹ For work levels of 250 kilocalories per hour.

² Calculate the adjusted air temperature (T_{adj}) using the following equation:

$$T_{adj} (^{\circ}\text{F}) = T_{adj} (^{\circ}\text{F}) + (13 \times \text{percent sunshine})$$

Measure the air temperature (T_{adj}) using a standard mercury-in-glass thermometer with the bulb shielded from radiant heat.

³ A normal work ensemble consists of cotton overalls with long sleeves and pants.

⁴ An impermeable work ensemble consists of impermeable coveralls with long sleeves and pants.

1.1.4 Recognition and Treatment

Any personnel who observes any of the following forms of heat stress either in themselves or in another worker, will report this information to his or her immediate supervisor or the SSO.

A. Heat Rash (or prickly heat)

Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.

Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.

Treatment: Remove sources of irritation and cool the skin with water or wet cloths.

B. Heat Cramps or Heat Prostration

Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Sudden development of pain and/or muscle spasms in the abdominal region.

Treatment: Remove the worker to the CRZ. Remove protective clothing. Decrease BT and allow a period of rest in a cool location.

C. Heat Exhaustion - **SERIOUS**

Cause: Overexertion in a hot environment and profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing.

Treatment: Perform the following while simultaneously making arrangements for transport to a medical facility.

Remove the worker to the CRZ. Remove protective clothing. Lie the worker down on his or her back in a cool place, and raise the feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of a salt-water solution consistency of one-teaspoon salt in 12 ounces water. Transport the worker to a medical facility.

D. Heat Stroke - **EXTREMELY SERIOUS**

Cause: Same as heat exhaustion.

Symptoms: **No perspiration**, dry mouth, pain in the head, dizziness, and/or nausea.

Treatment: Perform the following while arranging for transport to a medical facility.

Remove the worker to the CRZ. Remove protective clothing. Lie the worker down in a cool place, raise the head, and shoulder slightly. **Cool without chilling.** Apply ice bags or cold wet cloth to the head. Sponge bare skin with cool water or rubbing alcohol. If possible, place the worker in a tub of cool water. Do not give stimulants. Transport to a medical facility.

HEAT STRESS MONITORING FORM

Project Name: _____

Project Number: _____

SHSO:_____

[illegible]

2.0 COLD STRESS

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Localized cold exposure is generally labeled frostbite.

- A. Hypothermia: hypothermia is defined as a decrease in the patient core temperature below 96°F. The BT is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.
- B. Frostbite: frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 2°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

Prevention of cold related illness can be aided by educating workers on recognizing the symptoms of frostbite and hypothermia and by identifying and limiting known risk factors. The workers should be provided with enclosed, heated environments on or adjacent to the site, dry changes of clothing, and warm drinks.

To monitor the worker for cold related illnesses, start (oral) temperature recording at the job site:

- At the field team leader's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a worker's request.
- As screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation).
- As a screening measure whenever any one worker on the site develops hypothermia.

Workers developing moderate hypothermia (a core temperature of 92°F) should not return to work for at least 48 hours.

PROGRESSIVE CLINICAL SYMPTOMS OF HYPOTHERMIA

Core Temperature (°F)	Symptoms
98.6	Normal core body temperature
96.8	Metabolic rate increases
95.0	Maximum shivering
93.2	Victim conscious and responsive
91.4	Severe hypothermia
89.6 - 87.8	Consciousness clouded, blood pressure difficult to obtain, pupils dilated but react to light, shivering ceases
86.0 - 84.2	Progressive loss of consciousness, muscular rigidity increases, pulse and blood pressure difficult to get, respiratory rate decreases
78.8	Victim seldom conscious
64.4	Lowest accidental hypothermia victim to recover

In order to minimize the risk of the hazards of working in cold environments, workers will be trained and periodically reinforced in the recognition of the physiologic responses of the body to cold stress.

In addition, the use of insulated work clothing, warm shelters and work/warming regimens may be used to minimize the potential hazards of cold stress. Also, special attention will be paid to equipment warm-up time and freeze protection for vessels, piping, equipment, tools, and walking/working surfaces. The current ACGIH TLVs for cold stress found in this appendix will be used as a guideline.

APPENDIX J

SITE MAPS